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ABSTRACT

These guidelines were developed as one of a series of studies aimed at developing training in information technology (IT) for the information professions, and encouraging and structuring the harmonization of education and training among librarians, information scientists, and archivists, the three main professions which together make up the central stream of information careers. An introduction presents the study background and aims, provides a definition of terms, and discusses some broad questions that should be considered before designing a curriculum. Detailed guidelines for the application of general norms to the education and training of the information science, library, and archive professions are then provided for the following areas: (1) Infrastructures (Overall Information Systems and Development Plans, Manpower Planning, Investment for IT Training, and Planning an IT Program); (2) The Question of Harmonization (First Professional Entry, Recruitment to Senior Management, First Entry for Paraprofessionals, Recruitment to Teaching Posts in Training Schools, and Continuing Education and Retraining); and (3) The Curriculum (Scope and Range of Information Technology, Course Modules, and Course Construction). The guidelines are also presented in summary form, and a bibliography and references are provided. (KM)

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Guidelines on curriculum development in information technology for librarians, documentalists and archivists

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GUIDELINES ON CURRICULUM DEVELOPMENT IN INFORMATION TECHNOLOGY FOR LIBRARIANS, DOCUMENTALISTS AND ARCHIVISTS

prepared by
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United Nations Educational,
Scientific and Cultural Organization

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PREFACE

In most societies library, information and archives services are assigned responsibility collectively for the acquisition, preservation and communication of recorded information. To various degrees they also evaluate, analyze and disseminate the information contained in their holdings.

These services were initially created to meet fundamentally different user needs. Although libraries, information centres and archives might conceptually be considered as related parts of a single information spectrum, they have rarely, if ever, been fully integrated under one unified administration. Even though using increasingly similar techniques, in most countries each tends to continue to function in a different setting largely determined by the origin and nature of the material with which it deals.

Nevertheless each of these services has an important role to play in serving development. While libraries and archives continue to aid the general education and cultural development of mankind at large, they, like newer types of information services, may also contribute importantly to economic growth and industrial, scientific and technological development.

For some years the possibilities of developing common activities and promoting closer co-operation among the different but related segments of the information field were explored. Under the present economic constraints, such efforts, at both national and international levels, seem necessary. The practical benefits of such an approach have been extensively discussed in international circles and training institutions in many developing countries have organized their professional education along these lines. However, it has always been the viewpoint of Unesco that a co-ordinated and harmonious relationship does not imply an actual integration of these different types of institutions and the three professions. While there are certainly signs that the evolution of information technology and communications patterns may ultimately impose even closer ties, it is desirable at present that each develop its individual and specialized activities while, at the same time, identifying as many common areas as possible. In this way, the skills, experience and resources offered by each may be utilized to render optimal services to the whole community.

Some landmarks in the development of the concept of harmonization are worth noting, for instance the Intergovernmental Conference on the Planning of National Documentation, Library and Archive Infrastructures held in Paris in 1974, the Bellagio meeting in 1980, where F.I.D., I.C.A. and IFLA defined possible joint actions and programmes and more recently, the International Symposium on Harmonization of Education and Training Programmes in Information Science, Librarianship and Archival Studies, organized by Unesco, in Paris from 8 to 12 October 1984.

On the basis of the work and experiences gained, the Unesco Symposium made a series of recommendations aimed at promoting the concept of harmonization and providing teaching materials. The present Guidelines are part of Unesco efforts in this direction.

They are concerned with the teaching of technology within a harmonized approach, such as discussing in detail the context and conditions for the teaching of technology and providing a detailed proposal for curriculum development.

Information technology is moving very fast and its influence on the various information related professions will certainly take many different forms. It is not easy for educators to foresee in detail how technology will evolve and to decide how to train now for the technology of the future. In this context the challenge of writing Guidelines for the teaching of technology is a very difficult one. It is hoped that readers will bear this in mind when examining the document, taking into account also that this series of teaching materials is indicative and not prescriptive.

The designations employed and the presentation of the material throughout these Guidelines do not imply the expression of any opinion whatsoever on the part of Unesco.

Any comments or suggestions for improvement or any report on the experience gained by other countries in using these Guidelines are welcome. Correspondence should be sent to the Division of the General Information Programme, Unesco, 7 place de Fontenoy, 75007 Paris, France.

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University of Liverpool
June 1986

Michael Cook

I. INTRODUCTION

Background and aims

The present study forms part of the sequence of curriculum documents produced by or under the aegis of the General Information Programme of Unesco over the last decade, whose general aim has been to assist the development of training for the information professions. At the same time, it also forms part of a similar sequence of documents aimed at encouraging and structuring the harmonization of education and training as between the three main professions which together make up the central stream of information careers: librarians, information scientists and archivists.

The sequence of documents supporting educational development of information is listed in the introduction to what is the principal source document of this present study: W L Saunders, Guidelines for Curriculum Development in Information Studies. Professor Saunders traced the beginnings of his work in this field to a pioneer report by H Schur, for the OECD, in 1970. The theme was taken up by Unesco in connection with the promotion of planned national information systems, and the NATIS concept. A series of studies was produced in this framework, starting with D J Foskett's in 1976, and also prompted parallel work by IFLA and by other international organizations. Some important documents bearing on the subject were also published under the banner of UNISIST; particularly important were the Guidelines for Formulating Policy on the Education, Training and Development of Library and Information Personnel, by A Neelameghan in 1978.

The studies mentioned so far covered only the library and information science branches of information training. Work on curriculum development in the training of archivists and records managers appeared under the heading of Unesco's RAMP programme, particularly the present author's Guidelines for Curriculum Development in Records Management and the Administration of Modern Archives (1982).

An aspect of the NATIS concept was its interest in the training element of manpower studies. This was a marked feature of the Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures, held in Paris in September 1974. This conference received a paper by P Havard Williams and E Franz, Planning Information Manpower, which set out to give a framework within which the education and training of information workers could be harmonized. The authors considered the problems involved in establishing norms for entrance levels into training courses, and the relationship between these courses and the general education which the students ought to have received. They also set up a model structure for a harmonized training programme which incorporated several features in common between the professional groupings.

The programme for the promotion of specific areas of harmonization of training between the three professions took its origin, naturally, from the NATIS documents noticed above. It became a specific programme in 1979, when a meeting of experts held in Paris drew up a list of subjects which, they agreed, should form part of the harmonized sector of a training programme for librarians, documentalists and archivists. These subjects were reprographics; exhibition techniques; preservation; information storage, retrieval and dissemination; bibliography and sources of information; user studies; legislation; security; building design; and systems design with automation. As far as other subjects and the general approach of training courses were concerned, it was agreed that each of the professions should preserve its own orientation: there was no suggestion that a totally common training should emerge.

The move towards harmonization was carried forward at a meeting in Paris, attended by experts from each of the professions, held in October 1984. This meeting received papers which presented a specific outline curriculum for a harmonized training in three of the agreed common subjects. Two of these, Sene's paper on user studies, and Wasserman's on management studies, fall outside the scope of the present discussion. The third, Cook's on information technology, provides the immediate point of origin for the more detailed examination of curricula for teaching the principles and practice of information technology, which is the subject of the present work.

Set in this context, it is clear that the principal aim of this study must be the further promotion of harmonized education and training, in a specific area, between librarians, information scientists and archivists, considered as the main branches of professional activity in information. The general assumptions made in earlier meetings and studies continue to be made here: principally that each of the information professions ought to have both an educational and training programme specific to itself, and a career structure appropriate for the graduates of this programme. It is not suggested at any point that the introduction of harmonization between these training ventures should result in the blurring of professional duties and attitudes proper to the task of each profession. On the other hand, harmonized training should provide not only a body of common knowledge, and techniques, but also an improved consciousness of belonging to a common enterprise.

Definition of terms

So far, the terms 'education' and 'training' have been used interchangeably or together. There is a difference between them, and the present study is aimed at promoting both. Training covers instruction in the actual processes which are carried out in an information service. It seeks to ensure that these processes are efficient, aptly designed and effective for their purpose.

Training is not limited to practical instruction, but must include the aim of imparting an understanding of the theory and working principles of the system being taught. If this were not so, we would end up with librarians, documentalists or archivists who, having learnt to operate one set of processes, would be unable to cope with the situation when there was a breakdown, or when an older system was replaced by a new one (both of these are situations of high probability in the world of IT). Efficiency, self-reliance, and the regeneration of the system are also the concerns of training.

This statement is equally true of training given at different levels of expertise. Paraprofessionals, though they may not be charged with fundamental systems design, are still likely to be responsible, on the shop floor, for the efficient working of parts of the system. It is important that they should have some understanding of its working principles, as well as of its practical operation. This understanding must necessarily come from the training they have been given.

Education, nevertheless, is the vital commodity which trainers are usually aiming to impart, especially when they are dealing with first-time entrants to the profession. More fundamental and wide-ranging than training, education deals with life-views and the understanding of basic principles. If training gives an understanding of the operating principles of a system, education gives an understanding of the meaning and value of that system to its service, and of that service to society at large. It is also a critical understanding, one which is able to evaluate (and to appreciate) achievements, seek to correct errors and failures, solve problems and find ways of discharging all the possible functions of information services within the context of a particular society.

Each of the information professions has an equal and equivalent need to achieve good educational standards for its members. Librarians need to understand their function as supply points for a society in need of data and stimulus. Documentalists need to appreciate the role of input data in a system of research, development or technical process, together with the psychological and physical problems of data supply for a scientific group. Probably the most important job done by archivists is the selection of records for preservation and destruction. In this they have to draw on their own resources of experience, perception,

and general culture; that is, on their education.

Part of education is the process of acquiring knowledge. Viewed in this light, it is a commodity gained through the educational system of a country. A student who has received some twelve years of schooling, and perhaps another three years of exposure to an institute of higher education, is generally regarded as having become an educated person. It is assumed that such people know enough to operate intelligently in the world around them.

There are of course other ways of acquiring this status. In fact, education has another aspect which is less easily defined, and which is concerned with attitudes and habits of thought, and with the ability to weigh up evidence, evaluate statements, criticise systems, seek further information, and value the truth. This kind of education, the most fundamental kind, is not only vital to the health of a society, but specifically is necessary to the successful working of complex information systems.

Despite the primacy of education among the aims of a professional training course, it is inevitable that these guidelines will give more space to the training aspect, and to describing technical knowledge and processes. The reader is asked to remember that training programmes should always be planned in the context of the general educational development of the students, both as regards providing them with an input of educational material, and, more deeply, with a cultured understanding.

It remains to give some definition, for present purposes, of the term information technology. Taken widely, the term could be used to include nearly every process in an information system, from indexing to building design. Following the introductory study offered to the 1984 meeting (Cook, 1984), these guidelines are limited to a group of specific technologies: reprographics, computing, and the transmission of information over electronic systems, including some such transmissions in visual form. This brief summary leaves us with the need to indicate the main topics which are excluded.

A full list of exclusions would be a long one. The guidelines do not deal with the main electronic communications systems, such as television, radio or the transmission of data in general, nor with audio-visual technology as such. Another important technical area excluded is that connected with the production of hard copy information media: paper-making, printing, binding, book conservation or repair of books or documents. The technology of security systems is also excluded. In considering the use of computerised databases, questions which, though technical, belong strictly to the domain of traditional expertise - such as the theory of indexing and information retrieval - have been left to other curriculum statements. What remains is a direct consideration of the curriculum required to support training in the main areas of the new technology which present themselves to information workers of today as their essential tools.

The impact of IT has already been considerable in the structure of the information professions, and it is likely that it will cause further changes. It may be useful to include a short definition of the terms used in these guidelines to indicate areas of professional interest within the broad field of information work.

A general assumption is made that there are three professions or professional groupings involved, which are termed librarianship, documentation (or information science) and records and archives management. These terms are of course very much oversimplifications. Each of these professional groups embraces a wide range of activities, loosely bound together by tradition, the kind of training institution that has been responsible for initial formation, and the governing body of the employing service. Librarianship, for instance, covers such diverse fields as rural community librarianship, school librarianship, and information management within a specialised body. Documentation has also many forms, ranging from service in a specialised documentation centre to service in a research team in the physical or applied sciences or engineering. Records and archives managers are almost members of different professions, the former being responsible for managing the current or semi-current records systems within an organisation, the latter providing reference service and conservation of the historically valuable materials derived from administration in the past.

These three groups have together been responsible for the management of the services which have traditionally been regarded as the central information services of a country: national library, documentation and archives services. Looked at more broadly, however, information services have been ramifying into new areas, mostly defined by new technology, or by the development of old technology into aspects of information service. Cinematograph films have been with us for four generations, but it is only in recent years that we have become accustomed to the concept of film library and archive services. Television, a relatively new medium, has been faster to set up these services. Sound libraries and archives also exist, and have developed a very wide range of activities. The coming of electronic communications and recording in administration is causing the extension of records management into more central and more technological areas. All these new kinds of activity belong to the overall field of information services, all are linked, and all need training facilities for their manpower.

In some countries the training schools have responded quickly to these new demands. In the technologically most developed societies, information science has been fairly completely assimilated into the pre-existing schools of librarianship. The better equipped and staffed of these, especially in North America, have developed into schools which are dominated by technological concepts and courses. Elsewhere, although the importance of an information science approach to librarianship is everywhere acknowledged, in real terms the changes have been less radical.

Archives and records management training, even where courses are given within schools of library and information science, has responded much less quickly. In these, training is almost everywhere given in elementary computing, but only as a tool to assist the work of the archivists and records managers who graduate from the school, not as the vehicle for a new conceptual approach to information work.

General questions

There are some broad questions which should be discussed before the detail of designing a curriculum can be tackled. The most pressing of these - one which must be answered before any further discussion is possible - is the question of whether IT training can have universal applicability.

Advanced IT systems are in common use in parts of the world which have high technology. In these areas, it would be inconceivable that information personnel should not regard IT as providing much of the environment in which they work. New systems are constantly appearing, and staff members are accustomed to scanning technical journals to see which of them should be adopted, and in which direction new development, and new IT systems would be likely to point the service in coming years. In these countries, training schools have normally acquired a considerable investment in hardware, have directed their research attention to developing new software and systems, and generally seek to give their students maximum exposure to the highly technologised environment.

At the same time, over vast areas of the world the advance of new technology has been patchy at best. In the poorest countries it may not be possible to rely on the public electricity supply (which in any case is probably restricted to the principal cities), or on the telephone network. Document copying machines may be limited to the tried old method of the typed stencil; there may be no microfilm readers with light bulbs that work; it may be difficult to maintain current subscriptions to journals because of foreign exchange problems. In these areas, training schools (if they exist at all) concentrate on teaching manual methods, and preparing staff for small, practical services running at the lowest technological level.

Even in technologically advanced societies there are important groups of information workers who reject IT in so far as they perceive it to impinge on them, and would sustain the wisdom of retaining workable manual systems as the immediate goal of training.

The two kinds of experience mentioned represent the extremes, but the sad fact is that at the present time the distance between them appears if anything to be widening. The pace of innovation in new technology grows more rapid in the most ad-

vanced areas, while in the least developed areas investment in innovation, or even in the maintenance of services, may actually decline. In face of this what should the attitude of information trainers be?

The case for accepting a dichotomy between training for regions of high and low technology might at first sight seem a strong one, based on practicalities. However, there are some important considerations that throw doubt on its wisdom. Firstly, the new technological developments in information services do in fact provide the best ways of transmitting and disseminating information that the world has yet known. This is true of all types of information service. Librarians are using bibliographical systems which bring faster, more accurate and more usable information to larger numbers of clients over larger geographical areas. Documentalists are now able to ensure that scientists have the most complete and most current data, regardless of physical distance. Archivists are able to give remote access, to join in co-operative schemes and to utilise more current records than ever before. It would be a counsel of despair to abandon the possibility of bringing these new tools and developments to large parts of the world.

Nor is it necessarily very practical to avoid training in recent technology. Some information about new methods must always penetrate to low technology areas, and there are always sectors of those societies into which that penetration can be made effective. Thus even in the poorest country, there is likely to be a group of commercial firms in the capital which are using at least some forms of IT (spare parts catalogues on microfiche, stock control on microcomputer). It is inevitable that this slow penetration will continue, and probably gather pace. It would be unfortunate if the publicly funded information services should be excluded from its benefits because of deficiencies in the training of their staffs.

The fact that IT is penetrating their societies in this way is apparent to information workers in the less developed countries. At the ECARBICA conference held in Tanzania in 1984, for instance, professionals from each of the East and Central African countries reported that they had plans both for the introduction of automation, and for the development of new training programmes.

Low status is the besetting problem of information services and their staffs, over much of the world. Despite the acknowledged value of information services to development, it is customary to allocate a relatively low priority to their development and maintenance, to recruiting and training their staffs, and to giving them a place with good relativities in the career and salary structures available. If the technological aspect of training were to be neglected, restricted or excluded as a response to what seemed practical realities at a certain period, these problems of status would be perpetuated and compounded, and a significant aspect of the students' education would be stunted.

In some parts of the world, training facilities for information professionals are available only in the more advanced countries. If students have to be sent there, they will have contact with technology, and a local policy to exclude technological aspects of training would be nullified.

It is increasingly necessary to have at least some technological expertise simply to maintain an intelligent membership of the international information community: and we should be clear that information professionals in all parts of the world and in services at all stages of development, do and must belong to such a community.

This conclusion agrees with that of one of the early foundation documents of UNISIST, the UNESCO report on the feasibility of a world science information system (1971), which said that the

> "growing complexity of multinational information systems with respect to document analysis and processing requires that all parties to the operation, in whatever capacity and country, receive a common training which will enable them to understand one another and to collaborate on equal terms to the progress of information transfer". [cited by Saunders, 1978, p.5]

If these arguments are valid, then it is clear that IT should form a part of the training of information professionals in all countries, and that a norm, or basic level, of training in this sector should be established. Of course, it remains true that the rapid development of new technologies probably means that new kinds of careers in information work will continue to appear. The curricula used in training schools may give information students a grounding on which specialisms can later be built: special courses and electives can be used for this. The existence of highly technical specialisms will continue to give the training schools of the high technology areas a role in less advanced areas, as well as a specialised role in their own.

The three branches of the information profession are caught up at the present in changes brought about by rapid technological development, and it should therefore be possible to reach agreement on what should be considered a reasonably conservative norm. Information scientists and documentalists are affected by the constant appearance of new database systems, local networks, new methods of communication and new computer facilities. Librarians have to consider the effect of new book production methods in the more advanced areas, new distribution systems, and the effect of central services and library management systems. Archivists must deal with the new area of data archives and the management of machine-readable records, as well as with the advent of computers as aids to conducting their services. All branches are concerned with the education, support and extension of user groups, and with developing the subject specialities of those groups. In the face of these developments, old separatist feelings may tend to fade, and the sense of belonging to a single diverse information

system may tend to become stronger. Here is an atmosphere in which harmonization in training may have great attractions.

In a context of IT, harmonization not only becomes more natural but also more feasible. It becomes clearer, for instance, that the principle of distinction between the professions is based mainly on the source of their working material rather than upon a totally distinct methodology. Archives are materials that are generated within an organisation, and enter the system as a result of internal management processes. Books and serials enter the system by being bought in from outside. Documentation comes in by means of selective acquisition through databases. Once the appropriate media have been acquired, and are in the system, technology can provide mutually intelligible systems for processing and using the data, and for the provision of good user services. It can also provide an effective image by which the information services are known to the outside world.

There is a stronger argument yet for basing harmonization of training on the technological subjects. This is that the most dynamic ways of perceiving the nature and function of information services have been derived from them. Information science as a discipline originated in technological studies, and it is from this direction that recent models of library, documentation and archives services have been derived:

> "The library is ... a system comprising a collection of recorded knowledge, retrieval devices, users and library personnel, all associated in such a way as to maximise the knowledge transfer process. It is an integral part of human communication networks to store the recorded knowledge of past and present and to facilitate [its] retrieval and transfer" (Matsumura, 1982,p.121).

This definition of library service is drawn ultimately from systems theory, and hence from studies connected with IT. It is essential to the success of library and other information systems today that some such dynamic and systemic view of their nature and function is taken. We have seen in many places what happens when a static and limited view of them is allowed to rule: the result is atrophy, and the loss of society's investment. The teaching of IT, therefore, may be necessary because it is a way - possibly the only way - to impart flexible and dynamic views of service to those entering the profession.

Overall then, the case for including IT as one of the central features of a common core in the training of information professionals would seem to be a strong one, even though, as argued above, it might seem to be a subject much affected by differences of technological standard in the ambient society. However, it is important not to be too rigid about any curriculum matter. What is suggested in these guidelines is that it is possible to establish a basic set of norms in the IT field, as in any other; that these norms represent a knowledge area which is one of those which bind information workers together as a specialist group all over the world; and that they are a basic infrastructure on which further training and specialist careers

can be built.

Broad and general norms are only the basis on which specific curricula are built. When all is said, teachers in training institutes are responsible for designing a specific curriculum which is suitable for their circumstances, which operates within the constraints they experience locally, and which aims at meeting local needs. Such curriculum designers, since they too belong to an extensive college spread over the world, should take into account the general state of thinking and knowledge on the competing subjects, but should make up their own minds and be sure of their own expertise.

In particular, the application of general norms to the education and training of each of the professions will demand much thought. Each reader of these guidelines will presumably belong to one of the professions, and will be looking for appropriate ways in which to adapt them to their own outlook and needs. An attempt is made later to give some guidance on how choices can be made to suit the different professions, and it is accepted from the outset that the norms and minima set out here will have to be developed and supplemented to provide for specialist services.

In addition to suggesting what the basic and universal norms might be, guidelines like this may serve to structure conferences at which consultation with professional, user and governing bodies may take place. Consultation is also an important feature of curriculum design, and it is the feature which ensures that products of the course are of the kind intended.

1.Overall information systems and development plans.

Training in IT is needed to prepare qualified staff either for actual posts (not necessarily technical or specialist posts) within the information systems of a country, or for posts which are to be generated in connexion with a planned development. The first and most important factor in the required infrastructure, therefore, is the nature of the information system and of the development planned for it.

It is not the function of these guidelines to make judgements on the relative values of different aspects of an information system, or of the manpower plan which forms part of it. Other studies exist which evaluate the place of information development within general economic development, and which deal with the overall pattern of skills and educational attainment which the professionals should have who are to staff it: in particular, the studies by Saunders (1978) and Neelameghan (1978).

Nevertheless, it would not be reasonable to pass over this discussion without some reflection on the function which IT itself is to have in national development, the level of IT which is envisaged, the resources which exist to support it, and the role of IT training within the manpower development plan.

Within all development (and not only development in poorer countries) there is embedded a fundamental paradox: that while the rapid development of advanced technological methods in leading sectors may be of great value, at the same time planners and administrators would possibly give better service generally if they were to concentrate on providing well-run and effective low-technology or manual services which will actually operate successfully on the ground. As Foskett said in his basic survey of training programmes for NATIS,

> "It may well be thought that a greater impression will be created by advanced courses in automation, information storage and retrieval by the most up-to-date computers, games theory and management; but for a developing country, with perhaps an infant publishing industry and dire problems of foreign currency such programmes will not make a powerful contribution to the country's own development in those areas where a good library and information service will count most: in maintaining functional literacy and in supplying specialist information for local needs in industry and agriculture at the appropriate level and in the appropriate form." (Foskett, 1976; cited by Saunders, 1978, p.6).

In fact, the dilemma exists also in developed countries. Functional literacy is not perhaps such a widespread problem, but the efficient provision of information services for local industry, in support of specific training programmes or in the development of particular communities is just as important. Very advanced

technology existing in some centres of excellence does not necessarily mean that information services on the ground can give a general level of satisfactory service.

It is possible to find a compromise view, which will take advantage both of the widely recognised truth of the practical party's argument, and of the actual success and desirability of many technological services. The middle way between these extremes lies in developing IT-based services in a carefully planned manner, beginning with those which need the least complexity in installation and the least sophistication in training. Stress should be laid on honest and critical evaluation of the services' success, and on the provision of useful facilities. In this way it may be possible for IT to be introduced without extravagance and without exaggerated disparity between the most and the least advanced sectors of society. A plan for producing appropriately trained manpower is clearly an essential for such a plan.

It would be normal for the manpower development element of a national plan to contain provision for the development of training facilities. When considering IT, it would be necessary not only to plan for the necessary investment in training equipment, and teaching skills, but to work well ahead in assessing the precise purpose to be served by teaching IT to information professionals who are not to be specialist experts in a technological field.

There are two important general principles which may lie behind IT training and which form part of the rationale for introducing this element of training:

- the creation of a pool of professional expertise which will be able to relate to similar expertise in the world outside;
- to encourage within the trained workforce a true understanding of the scientific and rational principles which underlie all work with information.

To put this another way, IT has a function in professional education which does not depend directly on the skills involved in running technological services: it is desirable in itself. This feature may help to resolve, to some extent, the dilemma involved in reconciling the conflict between a few centres of high technology, set in a general background of low-level but workable services. The professionals who run both should share a common understanding of the principles and concepts of basic IT: there is a common core of knowledge which can be used as a basis for advanced technological specialities but also for the efficient and thoughtful running of practical information services.

Public opinion and user groups.

Factors which are taken generally into account in information manpower development may also have a more specific importance when IT is being considered. Public opinion is one such factor. A favourable (or at least not actively unfavourable) public opinion is generally thought necessary to the satisfactory development of information services. Without it, it will not be possible to recruit trainees of sufficient quality, or sustain a career structure which has comparability with other careers. It will also be difficult to carry through user education work. In practice, information services often exist through their early stages in an environment where there is hardly any public appreciation. The resulting difficulties of status and image are often among the most thorny of the problems to be faced in information development. IT brings with it a special set of problems in relation to public appreciation.

On the one hand, as Foskett implied in the quotation above, the appearance of high technology sometimes brings with it a high response in the form of public appreciation. The advanced technologist is sometimes seen as a figure comparable to, say, a medical specialist; though this perception may be accompanied by a feeling that the IT service involved is remote from real user concerns. The holders of advanced skills and knowledge are able to join colleges of technological workers in other fields, to speak the same jargon and be aware of similar technological problems. All this might have the effect of lifting one sector of the information professions into a social (or as one might say socio-technological) bracket which is sometimes not attainable by members who have only manual skills.

On the other hand, however, this development may be limited to the members of a narrowly defined subgroup associated with specific advanced centres, who may be perceived by the public (and perhaps by themselves) as a group distinct from the main body of information professionals. It is important that those who are responsible for running practical information services should be seen to be members of a large and complex information group, and should see themselves in that light. A rural librarian struggling to assist with spreading basic literacy; a documentalist in a provincial agricultural institute; a records manager trying to bring order into the files of the local branch of a Ministry; an archivist trying to persuade administrators that they can refer to files bearing on the subjects of present problems: all these belong to the staff of a country's information services, all should feel some involvement in a common purpose. Shared possession of a common core of knowledge of IT ought, in theory, to help this sense of commonality, and should also help to mould and raise the public perception that the commonality exists and has value.

The public is the ultimate source of user groups. In the case of the most obvious and well-known public services, such as the public library, it is a direct source; in other cases it is

indirect, and users are selected by various methods. All information services are for the benefit of more or less definable user groups, and the education of these groups is one of the preoccupations of management in the information services.

IT has a very significant role here. The more an information service uses IT, the more its users must receive specific training, and at the same time, the users' perception of the service changes. At the most advanced level, the users form a small, well-defined college of experts, and the information specialists probably tend to identify closely with them. Something of the same effect tends to occur at all levels of the service. Any degree of IT development produces an increase of technological awareness among the users, and a heightened self-perception among members of the service. It is true that the price to be paid for this is the beginning of a separation of the user group from the broad public, but a nation is, after all, a complex of interlinked specialist interests, a complex of user groups.

One conclusion is that training in IT must have an element of user education, and also that information workers who use IT have an enhanced need for subject knowledge in areas of interest to their users. These are ideas which have been familiar to educators in the information professions for a long time. It is interesting to see that new technologies are often tending to reinforce attitudes which at times have been regarded as excessively traditional.

The educational system and its institutions.

Information systems have a relationship with the educational system of a country. The educational sector is a major complex of user groups, and usually a major source of employment for information workers. The training of new entrants to the information system is one of the features of the educational sector. A country will normally have training for librarianship, documentation, records management and archives administration, all of which are based on particular institutions. Training for mainstream professional careers may normally be given in a university, but other types of educational institution, such as technical colleges, may be involved for certain categories of student. The introduction of training in IT has a bearing on the future planning of all of these courses, and on where they are affiliated within larger educational institutions.

If IT occupies a strong place in the overall curriculum, there may be an effect upon the recruitment of trainees. Without technology, information training schools may have a problem in finding a sufficient supply of good candidates. Information students ought to be people attracted by a life of service, in a career setting which no doubt has its satisfactions, but which is not invariably well recognised or well rewarded. They should

have a good educational grounding, for it is important that they should emerge from their training with a rounded culture, as well as professional competence. In countries where problems of recruitment and selection have been overcome, it is common enough to find that students have had a bias towards the humanities in their previous education, even though the growth of information science courses may have counteracted this to some extent.

Most areas of practice in IT can be mastered by those without a previous grounding in the natural sciences, but the people concerned must have a predisposition to accept the new orientation and to mould personal and professional development upon its influences. This change of view introduces new factors and poses the schools new problems in adapting themselves, their students and their teaching staff. Ultimately, the spread of IT throughout society, particularly in its most popular forms, will solve this type of problem by changing attitudes and attainments generally. At the least this type of personal and orientational changes will oblige the training institutes to think more seriously of integrating their recruitment systems, where these have been separate. In the meantime the period of adjustment which accompanies important changes often brings forward particular difficulties for the development of the information training institutions themselves.

The coming of IT does not of itself disturb the placing of the information training centres within the educational structures of a country, but their need for considerable investment in equipment and in expertise does reinforce the case for resource sharing, either between the training institutes themselves or between them and other services, for example computing or maintenance services.

Planning for the introduction or expansion of IT-based services in a country should take account of the likely supply of suitable educated applicants for training places, bearing in mind the attractions of other careers for which such people would be qualified. The information professions should in principle be held in as high a regard as any other of the technologically developed career avenues.

General level of technology and supporting services.

All information services presuppose that some level of technology should be present in society. Even the simplest rural library has a requirement (not necessarily always satisfied, of course) for an electricity supply, and access to telephone and public communications systems such as radio. There are of course parts of the world where these things cannot be taken for granted, and where nevertheless, information services must exist. Generally, a basic degree of technical underpinning must be assumed, which may be taken with the possibility of some technological development. In the case of the example quoted, the

most likely additional piece of technology would be the arrival of television.

In the most technologically advanced societies, there has been a considerable spread of IT into private homes and into workplaces. In the home, microcomputers may be a common feature, used for word processing, accounting, stock control and games. More rarely, the telephone link is used for forms of networking, such as for shopping or banking. At work, office communications, database management, accounting and word processing are common to the point of sometimes now having become normal. Predictions of the paperless office or fully electronic publishing have not as yet been realised, but certainly there are some societies in which the spread of IT has changed the attitude of the public, and has introduced a new broad level of technological skill and awareness.

The existence of such a level and some informed prediction as to where it will lead in the future must be important features to consider when introducing training in IT for the information professions. For one thing, public expectations of the information services and their personnel are affected profoundly by the public's own experience: these expectations are sometimes rather unexpected in their direction.

Public attitudes and the experience of IT which may have become common in society have also a bearing on what is after all the most important single factor in the design of training curricula - the market for the product, and the expectations of potential employers. The training needs felt and asked for by the employers as a group - whether these employers belong to government services or to other sectors - can be measured in amount and predicted in kind. This element should certainly form part of the manpower plan under which IT courses are introduced.

Visual literacy.

There are very few organised societies in the world today which have had no contact with new forms of visual image transmission. Even remote nomadic tribes in African desert regions have had some contact with forms of television, even though they may not be regularly exposed to them. The presentation of information in visual form is therefore so widespread as to constitute a normal method of communication today. The interpretation of this information is a user skill which is widely possessed to some degree. Expertness in using the skill is possibly less common than we may suppose. Certainly the possession of visual literacy, and indeed expertness in it, is a necessity for an intending information worker. Nearly every form of communication has a visual capability, and both input and output materials may have visual aspects.

Information educators therefore have the problem of building into their curricula elements which will carry forward the visual abilities of their students, to the point at which these abilities can become powerful tools in support of their professional work. Since time and resource constraints prevent the inclusion of curriculum elements which are too overtly concerned with the interpretation of visual messages, this part of the students' education has to be conducted indirectly.

There is a visual aspect to every one of the IT subjects (as well as to other subjects in professional training). In reprographics design skills and a knowledge of typography are involved; in textual electronic communications graphics are a strong and growing element; in visual communications the graphic and design elements are of course even stronger and more obvious. With these elements present in the curricula, it should be possible to use the syllabus to enhance the graphic knowledge and aesthetic sensibility of students without straying too far from the realms of what is immediately relevant to the training course. All depends on the abilities and educational background of the teaching staff, however. They should be able to design and use teaching aids in which the visual element is strong.

Demands of the information system.

This chapter began by recalling the IT course designer's dilemma, steering a course between training for basic services which really work, and, on the alternative, training for advanced technologies which may bring greater benefits to special small groups. However, this dilemma only becomes a reality when the information system as a whole becomes ready for development in technological directions. IT-readiness, if the term may be accepted, is a crucial stage of development, which must come at some point, early or late: it may come as a critical point in the growth of the country's internal information services; or it may come as a spin-off from one of the country's external communication links, or it may come in both ways. Planners should be aware of the state of affairs at any given point, and should watch for possible growth points.

IT-readiness has often been observed, for example, at one of two different common growth points, and it is likely that either could develop with little consciousness of the other. One growth point is the specialised high-technology installation, for example in a manufacturing plant or a research institute. The other may appear at a broader, more popular level, and come as the slow but inevitable result of the spread of public communication systems, and the spread of electronic or other IT devices, which then become gradually more commonly met with in public administration, business management, scientific research and education. Wherever such growth points may appear, it is obvious that they have implications for manpower planning.

The information system itself may generate IT growth points. It is likely that individual information workers, who have been exposed to IT, will press for some technologies to be introduced, in the same way that they will normally press for service improvements. These may be regarded as supply-side developments. If commentators from currently fashionable schools of economics are right, more soundly based developments could be demand-led. Users are the consumers of the product of information services; they too may become aware of the benefits to them of IT, and may seek to improve the services available in their own community. Demand-led improvements may often be observed in academic institutions, where the users form a cohesive and well-trained group.

2. Manpower planning.

The infrastructural requirements listed in the previous sections have effects on the planning of manpower for a technologised information system, or for a system which has become open to the introduction of technological processes.

The question of selecting, recruiting and training entrants to the various levels which will be required is one which should receive early attention. The recruitment and training of teaching staff should be an early priority. Naturally levels and numbers involved in a recruitment plan will be linked with that part of the plan which deals with the introduction of automated services.

The most important requirement, as with manually operated services, will be for a supply of entrants to the professional body; but those assessing training needs will also have to deal with the question of retraining existing staffs. Entry to the professional grades should normally be at graduate level, that is after completion of a basic university or first degree course (which may however include an element of information training). Professional training ought to supplement this university-level general education. Retraining would naturally follow previously existing methods, and the students would be expected to have accumulated experience in post.

Retraining in IT is sometimes a convenient way of providing career enhancement for those who, while displaying an aptitude for the job, might have found themselves in post without having gone through a full course of university education, or without having received a full professional training. It is fairly common to find numbers of such persons in some countries, for in the past information services have often been developed at a stage when full training facilities have not been available. The career prospects of practically-trained staff may be a point of difficulty, which the appearance of IT specialisms could make worse, but could also help to solve.

There should also be consideration of selection for training for entry at paraprofessional levels, and for the selection and retraining of some individuals for senior management.

It is an infrastructural requirement that there should be a supply of suitable candidates at the appropriate levels. Where IT is an important element in the training, clearly candidates must have an aptitude for it, and a desire to take its assumptions and practices into their lives.

Two difficulties may emerge here: on the one hand, candidates may appear who, probably having been educated through the humanities, dislike the prospect of having to venture into a technological area of knowledge; and on the other hand, technologically minded candidates may appear who have unrealistic ideas about career potentials in the information services.

Is it true that there is a large class of people who genuinely have no aptitude for work with technology? If so, it is likely that a proportion of them may have drifted into work with traditional information services. Certainly there is often a prejudice, or feeling, among the staffs of such services about the effects of introducing IT. In part, such feelings may be based on a fear that IT will put individuals out of work - generally a misplaced fear. In part, it may arise from an inadequate educational experience at a time when technology was perceived as remote, specialist and confined to mathematics and accounting. In real life, it is probable that, while there are certainly some individuals who may display a rooted objection to working with IT, most people are willing and able to adapt themselves to it, and many find personal interest and fulfilment in it. In order to discover these, aptitude tests should be applied at the point of selection for entry into information training: this in turn means that the training institutions must set themselves to project a technological public image, especially in cases where only manually operated services have been familiar.

The second problem mentioned, the correspondence between the actualities of information careers and the expectations of technologically oriented students, is equally fundamental, and bears upon the well-recognised problems of status which have often been recited. Information professionals should of course have career structures which compare with those open to members of other professions, both within the public service and in the private sector. An imbalance here (and in many countries there is one) can have a serious effect on the working of the information services. This effect will probably be exaggerated when IT comes into widespread use, for technology, particularly computer technology, is usually associated with relatively glamorous career expectations. If the difference of career status between professionals in IT and those in, say, data processing or database management in industry, is excessively wide, there will be a depressing effect on investment in the national information system and on the standards of operation of the service. Depressed standards here will inevitably reflect on the numbers and suita-

bility of candidates for entry or for retraining.

It is clear that underlying these questions is a set of much broader ones, the condition of the public education system and the public image of information services. The potential for recruitment into these services is likely to be radically affected by the supply of suitable candidates, and this in turn is likely to be affected by the level of investment in IT, the way this is perceived by the public, the way it has been taken on board by the training institutions, and generally by the vigorousness with which information development is being pursued.

Since IT has shown that it has a strong capacity for permeating many aspects of society, the very fact that it exists and is spreading through administration and management affects the state of mind of members of the information professions, and this fact may help to solve some of the problems of retraining or of developing new attitudes.

Recruitment levels and the makeup of training courses is discussed below, in connexion with the institutional setting.

Policy for overseas training

By no means every country supports its own training institute for information workers; nor is it always the least developed which has made the option of relying on training facilities abroad. The arrival of IT has introduced some new considerations into the debate on whether or not information training should be provided within the borders, though as with traditional information studies, the option usually remains of continuing to use educational systems elsewhere in the world.

The new considerations centre upon the closeness of the relationship between IT services in society and the supply of trained manpower for them, coupled with the relatively high cost of introducing these services. These factors reduce the marginal tolerance of waste which traditionally exists in the interface between the client and the product. In this case the clients are the information services (and the labour market which they generate), and the products are the professional entrants who have received the training. There is usually also some misfit between the actual supply of trained personnel and the numbers of posts foreseen.

Additionally, IT comes as an additional facet of the information services, and therefore should have the effect of increasing the total manpower demand. However, it remains true that information training, even (or especially) where it includes basic IT skills, is a suitable educational base for recruitment to other work. Qualified librarians, documentalists, records managers and archivists can, of course, seek other work. If they do, they ought to find that their education and training is a help to them, the more so if it includes an understanding of

technologically based communication systems.

For these reasons, countries which have no information training institutes of their own, may find it necessary to reconsider the question of setting these up, at the moment when the introduction of IT into public services becomes pressing. Since IT mplies changes to the curricula of all professional studies, this is a suitable moment to plan the overall work of a training institute, and to make it a harmonised one. Recent discussions in Regional branches of the international professional associations have been along these lines. There are also considerations of relevance which must be remembered if training abroad remains the chosen option. These considerations are discussed, e.g. in Saunders (1978, pp.10-11) and in Cook (1982, pp.11-12).

The institutional setting

There are different ways of relating professional to general education, so as to ensure that all new entrants have received the equivalent of three years general and one year professional education at university level. The different possibilities are discussed, e.g. in Havard Williams & Franz (1974).

Training for IT should be viewed in the same general context as that for information work generally, that is, one in which a broadly-based education in humanities and sciences is valued. It is not possible to maintain a good standard in public information services where the fundamental values of the cultural heritage of the nation and of mankind are not understood and respected. Traditionally this has implied that professional education should be set within a university context, so that the students can share in the academic and social activities and facilities of the parent institution. The argument is the same where IT is concerned, though there may perhaps be a case for setting specific training courses, related to specific systems or specialisms (especially for paraprofessionals) in a technical college or other specialist institute. These questions have been much debated, and in many parts of the world schools of library, information and archives studies exist within universities.

The harmonised model for information training provided by Havard Williams and Franz (1974) (and which is discussed in Part III below) suggests that IT ('mechanisation' as they term it) can be a common stream added to the three principal courses. This raises the possibility that the IT component could be dealt with in a distinct technological institute, rather than being built into the curriculum of professional training schools. In principle, the former solution is less desirable than the latter, since IT brings with it important differences of professional practice, which ought to be allowed to influence the teaching of professional subjects. In fact IT represents an area of professional studies, not an extraneous technological element distinct from professional experience. Still, it remains true that

investment of hardware and expertise can sometimes best be centralised in technological institutes.

The introduction of IT implies changes in the physical resources of the training schools as well as in their perceived aims and in their curriculum. As is well known, a proper installation of equipment for IT is, by traditional standards, expensive. No longer is it true that the equipment of an information school can be provided at a handicraft level; statements such as that of Saunders (1978, p.12) that

> "library and information studies do not call for highly specialised and very expensive accommodation such as that required by a department of engineering or chemistry..."

is now not necessarily true. The second half of the statement, that

> "it is of great benefit to the teaching programme if the accommodation can be tailor-made for its purpose",

however remains true. It may be advantageous in some circumstances to seek sharing arrangements which will reduce the cost, but nevertheless a training school which includes IT in its curriculum ought to have access to proper equipment. This means, of course, that there must be appropriate initial financial backing, and also provision for maintenance.

Saunders points out that there are many instances in which government and non-government organizations, trusts and foundations have provided the capital cost of building and equipment for information schools. Equally these sources have in many countries been used to transform and upgrade older information schools by installing IT facilities. The result has been to create a wide spectrum of information schools, ranging from those which can provide training, from their own resources, in practically every possible technological specialism, to those which can do little or nothing beyond discuss theories of information science.

As one would expect, training schools in the less developed countries tend to be among the least well equipped in this respect, but it is also true that some of the schools in more advanced countries have failed to respond radically to the challenge of IT, and have remained in a manually oriented mode, or have accepted only a limited range of IT facilities. Consequently there exists a range of models, with varying levels of technological specialism, which can be adopted by those planning new schools or new developments within schools.

Investing capital in new training facilities demands more than purchasing equipment. The development plan should be based upon the advice of professional consultants, and buildings should allow for three functions: teaching/learning, technical work and support services.

There is no doubt that the best solution overall is for the training school to form part of an established university, and for the IT component to be developed in association with the

university's computing and other technological facilities. Training for IT, even at a basic level, demands more than the purchase of hardware. All the equipment, hardware and software needs maintenance, and this maintenance should be of a positive kind. It should aim, not merely at protecting the machinery from breakdown, but at the constant work of adapting current systems to new developments and applications. Maintenance should be the responsibility of specialist technicians. Teaching too, often involves supplying information or support work beyond the reach of information specialists: special 'front-end' programming, for example. This kind of support, and the computer power which goes with it, is usually only available where there is a large academic computing unit in the background. The same consideration applies to the other kinds of IT.

IT courses, especially for paraprofessionals, can indeed be supplied, if the ideal is not possible, in other ways: in independent training schools, in technical colleges, in working information services, or under the aegis of professional associations. These methods can certainly be considered in preference to no IT training.

Teaching rooms.

Saunders (1984, p.66) suggests the appropriate teaching methodology:

> "Informal lectures, small group teaching, supervised exercises, some seminars, visiting speakers (from the region where possible), visits to centres using new techniques and as much 'hands-on' experience as possible. Good handouts (e.g. prepared notes for students) are essential."

The shape and layout of the teaching rooms should correspond with the kind of pedagogy to be used: this is equally true, of course, of traditional or manual curricula. It should be possible to use teaching equipment such as projectors, and it should be possible to conduct seminars in which the students present are actually able to take an active part. These are requirements which suggest smaller teaching rooms in which the furniture can be arranged in different ways, allowing discussion groups, or working parties around a table. Large, statically equipped lecture theatres are not likely to be suitable in this context.

However the introduction of IT must make a difference. There must if possible be the opportunity for each student to undertake practical work ('hands-on' as the term is). This suggests teaching laboratories in which there are a number of terminals, together with peripherals such as printers; all this needs a supporting framework of electricity supply points, lighting, and airconditioning (for electronic machines generate heat). This kind of installation necessarily militates against the principles of flexibility and informality which are important in the seminar rooms.

It is also likely that there will be some need for access to a formal lecture theatre, in which the lecturer must occupy a central point and use teaching technology to impart information to a group of students. The lecturer may, for example, wish to use a cathode ray tube (CRT) monitor in order to display a videotape, or the output from a computer operation. For this kind of purpose, there exists a range of advanced teaching equipment, and it is likely that new forms of this will be developed in the near future. It is possible to install a wall-size flat screen which will display computer or television output to an audience which may vary from a class of students to a group of managers who are considering a new system or decision. Less expensive installations may perhaps be limited to providing a room where a battery of CRT monitors, a videotape recorder (VTR) and a microcomputer could be brought in and linked together.

In planning such accommodation, it is not only a question of providing the necessary plugs, electricity supply and airconditioning, but of arranging the furniture for participants. Decision groups may wish to sit around a table; student classes may be better placed in audience seating or in a group around the teacher; either way there are formal or informal arrangements of the furniture to correspond with the occasion.

Reprographic workshops introduce a new element (which however corresponds to the requirements of conservation workshops, discussed by Cook 1982, p.14). Reprographics is also a science-based technical subject. Practical work in the field is done by specialist staff, who may have been trained in a craft school or technical institute. The availability of support staff may determine whether or not the information training school decides to create a laboratory. A simple laboratory which can be used to help train professionals who will have to manage reprographic (or conservation) units during their careers are possible, but only if proper staffing is available. Ideally, such a laboratory should be used for an ongoing programme of work, independent of the teaching schedule. In any case there should be a skilled technician to maintain it as a base for teaching and research activities.

Reprographic hardware is likely to be as perishable as electronic hardware. Airconditioning and a controlled environment are necessary, particularly since there will be a need to store consumables, some of which may consist of volatile chemicals.

Teaching laboratories and technically equipped teaching rooms lend themselves to resource sharing, and to the offer of joint operational or research services. The larger the parent organisation the better would be the possibilities for securing a larger and more complex range of equipment, and for a better level of maintenance. In a university setting, it would presumably be possible to use a central computing facility, with access to a range of software, and to use centrally provided programming skills. Central security services might also be a

useful addition.

Support services.

Introducing IT as a new course element presumably means increasing the numbers of the school's teaching staff, which in turns means providing more lecturers' rooms. Teachers of IT must of course have access to the appropriate technological services, and this may mean provision for terminals or microcomputers in their rooms (in any case the spread of IT practices probably means that at some point during the coming years all university teachers will expect access to a terminal).

Library facilities remain essential. Existing libraries will find that they need to widen the range of literature acquired, which of course has financial and spatial consequences, and might also provoke a revision of staffing levels. The published literature on aspects of IT is very large, so that in addition to initial investment in acquiring backlog material, there will be continuing expenditure on journals and abstracts. Journal articles and grey literature are particularly important in this subject, as obsolescence comes so rapidly.

The question of linking the school's library to some or all of the IT services available in the country will be one for the school's planners. Students who are to manage online databases should naturally get used to being users of them.

Storage of consumables and provision for support and maintenance staff has also to be considered. Such personnel also need rooms and workshop space. Resource sharing is of course a possibility.

Other than space, IT makes no special demands on other student, staff or administrative accommodation. It may imply more and better storage for materials, and it will probably demand a higher level of security measures and inspection. Schools may find that bringing in IT equipment makes it necessary to make formal provision for planned security systems. Electronic equipment in particular, will have to be kept in locked accommodation (possibly with reinforced partitions and windows), and used only in supervised conditions. Night-time guardians, perhaps assisted by special lighting and closed-circuit television may be needed. The advent of portable and highly saleable microcomputers, while improving the access of information professionals, has intensified the security problem. This negative side of the development may have important effects on working conditions. A determined effort should be made to ensure that the security measures do not harm the morale of staff or students, or damage the relationship between them.

Forward planning is always a necessary activity in every educational enterprise. Where IT is concerned, it is particular-

ly necessary to have an outline plan which takes account of likely or actual technological developments which will have to be included in the curriculum at predetermined years. It is very likely that these developments will have consequences for the physical setting of the school, the numbers of staff and students involved, and the training or retraining of teaching and maintenance staff.

For example, it is likely that at some stage the question of maintaining an online database, or of running a machine-readable archive will become urgent. Both of these would demand a considerable amount of new investment. Good advance planning would help to avoid at least some of the practical difficulties which might arise, such as finding space for another laboratory.

3. Investment for IT training.

The discussion so far has assumed that an information training school must invest in its own materials, at least except where a resource-sharing operation is possible. This question should be re-examined in the light of the things needed for the different parts of the curriculum.

Technological information training programmes have to have a sufficient investment in hardware, software, and expertise (sometimes called liveware). Important features of the system chosen should be student access to the systems, research access, maintenance and planning for future development.

The case for resource sharing in reprographics is particularly strong. Here the level of technological expertise required by information users and professionals is relatively low. More advanced technological knowledge and skills are required by the technicians who run reprographic services and maintain the hardware. Information professionals must know about the capabilities of the various devices and systems, since these have a direct effect on the design and performance of their professional services. Developments in high-speed xerographic copying, for example, have obvious implications for publishing information materials, for disseminating documentation and for the disposal of records. Microfiche equipment can remove the need for sending books and documents by post, and may influence records centre design.

The best way of teaching much of this is by observation of working installations. This means that training schools ought either to be sited near to working reprographic workshops, or should plan to run current operational services using their own reprographic installations. A mixture of these two approaches may be possible. (Working reprographics programmes may be a useful source of income in some cases; but such programmes based in training schools will have to accept that the teaching function has absolute priority).

Facilities which allow the observation of working programmes may be the most useful both for the training of information professionals at first entry, and for the advanced or specialised training of managers. There will perhaps be different considerations when the training of paraprofessionals is considered, for graduates of these courses may be expected to actually operate certain reprographic services when they come into employment. Even so, the main purpose of the training programme must be to give the student a basic understanding of the theory behind the system, together with some detailed practice in operation and maintenance. Basic or initial training will not need to go much further into the technical underpinning of the system, since that will be the province of technicians or specialists. A workshop which can support an active reprographic programme may well be suitable as a base for the training of such specialists.

It is desirable to underline the fact that reprographic laboratories (again like conservation laboratories) should not be regarded as existing purely for academic purposes. They should have at least a minimal ongoing programme of work. Equipment used only for teaching (and therefore for only part of the year at best) always deteriorates and in a purely educational environment it is difficult to ensure that it receives the right level of maintenance and supply of consumables.

Electronic IT systems present different problems, for it is less likely that associating them with current operational programmes will be useful.

Word processing should certainly be among the practical experiences received by students. They should be able to sit at a console and write their own textual material: this would be a much more appropriate method of approach than simply observing someone at work. The hardware for such a facility may of course be shared, either with another department or with an active administration, but if this is done, the student must have sufficiently free access to achieve familiarity. A better approach to resource-sharing would be to have multi-purpose machines. Terminals or microcomputers for computing work can usually be used with word processing software. Student access to them is likely to be better than if they are in demand for administrative uses.

The extension of word processing into office communications systems and database management may best be regarded as part of the students' practical, but if resources are limited, this part of the course might perhaps be dealt with by observation. Office communications systems have important implications for information services. These include the possibility of new forms of publication, new forms of disseminating documents, and the potential of managing machine-readable records through office systems.

The teaching objectives adopted by the school should include familiarity (but not necessarily a high level of practice) with standard keyboards. Students' lack of experience of keyboarding may present a problem. In the past typing and keyboard skills have often been regarded as 'commercial' assets, associated with low social status. Basic typing has featured in the training of information paraprofessionals, which, however useful, has not necessarily tended to improve its standing among comparable practical skills. In the world of IT, however, familiarity with appropriate standard keyboards is a very desirable attribute at all professional levels. Should it be included as a central aspect of the course, with students expected to reach a defined standard? Future developments in IT are likely to require that professionals (and senior management staff) should be able to input their own material (data or commands): the interface between professionals and system they operate is always a sensitive point.

Computer appreciation is a subject which may at the early stages be taught on a resource sharing basis. In a large institution such as a university, central computing services are accustomed to give introductory courses in computer literacy, as well as more advanced courses, to their user population (teaching staff and students). They ought to have the equipment and facilities to do this. However the borderline between general basic knowledge of computer systems and the knowledge of professional or specialised uses is difficult to define. Elementary knowledge rapidly merges into specialised knowledge. Because of this, it is generally better to give this type of instruction on dedicated or departmentally owned hardware, using software, or teaching programmes, tailored to professional uses. The advantage of being able to do this may be considerable if the student body is inexperienced in the technological field.

There are problems in deciding where a course in computer literacy should stop. It was agreed at the harmonization meeting held at UNESCO (UNESCO 1984) that it should not normally be expected that students should be given a practical course in original computer programming in a high-level language. On the other hand, it was thought desirable that students should receive fairly specific and detailed instruction on using systems important to their professional area of interest: in fact a detailed knowledge of the command language of such a system would probably be more useful than a knowledge of general programming.

The skills resulting from a balanced course in computer appreciation would include a knowledge of the main types of computer hard- and software, bibliographical and documentation formats, and a general knowledge of the range of peripherals possible. Students should know about the possible techniques of data capture and input (card punch, OCR, formatted screens, etc), data output (print, COM, online search), data storage (optical data disk, magnetic tape) and data communication (telephone link, user network). It is unlikely that all of this could be done through the resources of the training school alone; resource sharing or a programme of observation would be necessary in most cases.

Telecommunications may offer the possibility of inhouse instruction which does not involve enormous investment, and even of giving instruction in countries where there is as yet no general public information service based on it. Television-based information networks are becoming very common in developed countries, and clearly all information professionals must have at least a general knowledge of them. A training programme dealing with videotex or teletext services could certainly be set up within a school or within a university, if linkage to a public or a wider network were not possible.

Practical instruction in the use, design and maintenance of online databases is certainly something which can be done within the resources of a training school, and up to a point investment in this is an essentil. The school may certainly use hardware

and operating systems provided centrally or in shared installations, but it ought surely to have the facilities to access an appropriate database system, to allow the students to practise using the command language, and if possible to set up a local area network (LAN).

Investment in software can less easily be shared. Where central computing services are used, software acquisition, enhancement and application is the business of the central computing staff. Much expertise is required, as well as purchasing power, and it may often be best to let the central computer staff take responsibility for it. Somehow or other, however, the information training school must make sure that it has the use of all the appropriate software it needs: database and information retrieval packages, systems for communication and for the output and dissemination of data, and systems for data storage. IT programmes can hardly go ahead without provision for acquiring and installing these, and for maintaining and improving them over time. This means investment in expertise as well as in the purchase of software. The expertise may involve not only what is needed to install and run the programs, but also the ability to negotiate with manufacturers of hardware and software.

Staff and student access requirements vary primarily with the numbers of people involved, but also with the range of courses offered. An overall principle is that access to hard- and software should be as free as possible. The ideal is that students and staff should be able to find a terminal available for their particular work at any reasonable time. In real life, doubtless, it will be difficult to approach this ideal, and compromises will have to be accepted. What should be avoided at almost any cost is the situation where access to the systems is so restricted (either physically or by cost factors) as to put it outside the scope of daily practicalities.

If students have to regard their IT training as mainly theoretical, and without any real basis in daily professional practice, the whole orientation of the training course should be directed towards making their grasp of theory good enough for conversion into future practical use. A knowledge of theory, concepts and terminology can be reactivated by retraining programmes in later years. But if students do in fact have reasonable access to the systems, then the thrust of the course should rather be towards giving them a sound practical experience.

Future planning is once again important. Information systems, and the hardware associated with them are constantly developing. This means that demands on the training courses will develop and change, and their access to equipment will have to respond to these changes. If resources are shared on any scale, the plans of the sharing body will have to be considered. Central computing services, for example, will certainly have long-term plans for replacing both their central processing units and their input/output peripherals. Replacement may involve buying a new mainframe, and consequently negotiating with different manu-

facturers. In this negotiation the needs of the information course should be taken into account: the new machine should be compatible with the old in certain respects, and new software should be available both for adaptation and for developing the information systems. Participation in consultations between the computing service and its users is essential.

Personal support services.

Information training schools need all the facilities for staff and students which any other institute of higher education would need: housing, finance, social and administrative backing. This forms one important argument for including these schools in the wider background of a university.

Social and administrative needs are independent of any consideration of IT, but when IT courses are newly introduced, there is not necessarily any immediately perceptible difference to them. Over time the inclusion of a strong element of IT in the courses offered will bring about changes in the relationship between the information school personnel and other members of the academic community. The school will be in the forefront of the various pressure groups interested in the improvement of technological services. It may suggest or press for inhouse television, with data transfer linkages, improvement of the telephone service, or the installation of cable linkages between departments. The information school will in general be interested in developing electronic communications within the university, and between it and the outside community. These aspects of the influence of the information schools are parallel to the influence they may exercise even before the appearance of IT, through library, documentation and archives services. Over time such influences ought to spread throughout the community at a deeper level.

Conversely, the lack of a wider background of social and administrative services may have a harmful effect on training schools which are separate from a larger academic institution.

Teaching staff.

When a training school decides to embark upon a substantial programme in IT, it may find itself in much the same position, in relation to finding teachers for the new subject, as training schools found themselves in the days of their first beginning. A shortage (perhaps even a total absence) of suitably qualified and experienced teachers is likely to exist. As with other professional subjects, teachers should in principle be both academically qualified and professionally experienced. If a body of such people does exist and can be spared, and if finance and other

provision is available, then there is no problem. This happy situation rarely exists in any country.

A training school may adopt some devices to overcome the difficulty caused by shortage of specially qualified teaching staff. These are similar to those adopted for finding teachers of all the professional subjects in the early days of development. These are the main options:

- to use existing skilled professionals who are in operational posts, on a part-time basis;
- to use the services of teaching staff in other institutions, departments or disciplines;
- to bring in expatriate experts;
- to recruit and train local staff who will eventually be able to acquire suitable expertise and develop appropriate programmes.

There are of course drawbacks with each of these options, which have often been discussed by those concerned with developing information training.

The special feature of IT training is the closeness of its relationship with the development of technologically-based services in society at large. In theory this means that the recruitment and training of suitable personnel, both for teaching and for operational work, will have been considered by national planning bodies, and that there is consequently suitable provision in the national development plan. Unfortunately this does not happen in practice as it ought. Moreover there is usually a tendency for IT services to appear in certain sectors of society without regard for what is happening in the main national information services.

How these factors affect training development is seen if we consider what is involved in using professionals in post as part-time teachers. Where may suitable candidates be found? If there are any operational IT systems, then of course the professional staff who run them ought to be qualified, and might perhaps be sometimes available for teaching duties. Where there are no suitable public services as yet, part-time teachers would have to be sought wherever there are IT systems of any kind. This might be among documentalists or information managers in multinational business or manufacturing firms, or newspapers. If they are free to teach for some hours each week, these people may indeed help to bring in new standards of IT in countries where public investment in these systems is not thought possible. The difficulty is to find them, and to arrange for them to be available. Finance is not the only difficulty, as there are also problems of access to systems which may be hedged with security precautions.

It should always be remembered that teaching by part-timers who have operational responsibilities, is likely to perpetuate traditions which were absorbed by the part-time teachers during their own training and during their years of experience. In this

respect it is like training through apprenticeship. By contrast, full-time teachers in academic posts have the duty and ability to learn of innovations, and to devise the most appropriate methods of pedagogy. This dichotomy (between conservatism and innovation) exists in all teaching which uses part of the time of busy people, but in connexion with IT, it is a particularly damaging problem. Innovation is always a strong feature in IT systems, and it is important not to become wedded to particular packages or systems. The value of having full-time specialist staff of good academic status who are able to undertake research into their chosen field is particularly recognisable where any form of IT is concerned.

The device of using the services of teaching staff who belong to other disciplines or departments may be useful in the case of IT subjects, just as it can sometimes be with more traditional subjects. An information school will always have some need for this kind of outside help. Literature, languages, managerial sciences, the techniques of criticism, investigation and research are examples of subjects relevant to information students which might be taught by sharing courses or by using the time of teachers from parallel departments. In the case of archival training, administrative history is an example of an essential subject which may depend on teaching from outside the department. Provided that courses are properly designed, and that it is not just a case of students sitting in on courses with only vague relevance, there is little theoretical objection to this solution. The problem with IT is that it is likely that there will be little opportunity to find appropriate parallel courses.

Reprographics might not be taught as a subject at all otherwise than in an information school. Craft or technical teaching might be available at too low a level, and in another type of educational institution. Computer appreciation and programming might indeed be available, but with little likelihood that the software and systems used may be appropriate. The bibliographical, information retrieval and text management packages used by information professionals are not necessarily widely known outside the information world; and computing for the humanities, which would use some of the same materials, is as yet not yet much pursued outside a few specialist centres. Most computing facilities or centres of computer study tend to concentrate on work in the natural sciences and in mathematics, or else in management systems for business administration. This option of shared courses therefore should be used with care, and in any case may not be readily available.

Expatriate experts are a traditional resource which may be used to set up new courses. International and bilateral aid agencies are accustomed to projects of this type, which usually include some provision for recruiting and training a local successor. The device may be considered for developing IT options in an information school, and in some circumstances it can be an excellent one. It is important to be aware of what these favourable circumstances would be. They would include

where the expatriate would reinforce, and add a training dimension to, a planned IT development, where provision had been made for recruiting trainee staff, placing them strategically in post after training, for introducing the necessary hardware and systems, and for using and maintaining these. Unless this precondition exists, the case for importing expertise is difficult to sustain: the expert would arrive, find constant difficulty in arranging practical teaching, and would eventually depart leaving no graduates in suitable posts and without equipment for carrying on the programme.

Since teachers of information subjects need both academic education and professional experience, it may not be possible in the early stages of automated services to recruit teachers locally. The option of recruiting someone academically well qualified but without professional experience has sometimes been adopted, and has sometimes worked well: all depends on the individual. IT is rather a special case, since it is in a sense a group of skills and areas of knowledge additional to the body of knowledge ordinarily available to an information professional. To recruit qualified and experienced librarians, documentalists or archivists, and to provide them with specialised training in IT, would be a more reasonable approach to solving the problem of finding teachers of this subject, than it would be to recruit a graduate in literature to teach librarianship, a graduate in chemistry to teach documentation or a graduate in history to teach archives administration.

There is a particular need to provide for updating or retraining courses in connexion with IT. There is usually a strong case for providing a constant series of updating courses so that in due course the whole body of information professionals in a country could receive instruction in IT developments. The professional associations can play an important role in supporting this activity, which has the character of a general upgrading of the body of workers, and of the systems they operate.

Retraining courses are more aligned to giving quite new types of skill to individuals who will be called on to exercise these skills in new systems or services. Thus updating courses could be used to disseminate knowledge about developments in television-based community information projects among public librarians working in local communities. They can be used to spread information on local area networks among documentalists working in associated research institutes; or to demonstrate the possibilities of microcomputer control systems in records management, or of online search facilities for users of archives services. Retraining would be necessary if a group of manually-based information workers were recruited to act as a planning unit for the introduction of automated services, or to operate a newly established electronic communication system.

Students.

As indicated in previous sections, training in IT must be related both to planning for IT services in society and to the design of professional training courses. The question of numbers and level of students to be recruited and trained depends in the first place upon the national plan. The supply of trained manpower is likely to be a more fundamental constraint on the development of technologically-based information services than is the supply of hardware, or even the supply of teachers.

However, although the number of trainees and the level at which they are to operate are questions to be determined in relation to the nature and extent of the technological services to be developed, there are some knock-on effects to be considered. Technological information services cannot run in isolation from existing non-technological services. For example, local area networks (LANs) would in all probability need input of data sources from pre-existing documentation services; online database services would probably base their access points in pre-existing library centres; automated records management or archival services would of course be built upon services already in operation, or at least planned. In addition, it has been consistently argued in these guidelines that basic knowledge of IT is in itself an educational requirement for all information professionals. IT informs and changes the methodological aspects of all professional studies in information work.

If therefore IT components are to be added to information training as a result of new developments in information services, there are three aspects to the training requirement:

- -the training of specialists to run the new elements in the service;
- -the background training of new entrants to the information professions generally;
- -the retraining of information workers in post.

The method adopted to provide for these three aspects may take the form of a general IT component in existing training courses, together with provision for updating, upgrading and retraining courses, plus provision for specialist training in particular areas. These guidelines are not concerned with the training of specialists in any branch of IT. Their area of interest is the basic or generalist IT component which should form part of the training of all information workers. The guidelines simply indicate the nature of some of the possible advanced or specialist options.

Levels and aptitude.

Training provision has to be considered at three levels: professional, senior management, and paraprofessional.

It is generally agreed that information professionals should be graduates, that is, should have completed a first degree course or its equivalent in addition to their professional training. Differences between national practices are wide, and the general university-level education may be given either before the professional education begins, or it may be given coincidently, as part of a composite course. The introduction of IT makes a difference here, since its concepts and practices may also influence the teaching of general subjects: for example there are important uses for IT in the teaching of languages, sciences, management subjects and even in the humanities. The concepts and powers of IT also penetrate deeply into the subjects of professional study in information training. Despite these interrelationships, it remains desirable for the training aspects of IT - its strict application to professional subjects - to be treated wherever possible in a purely professional context.

Senior managers are usually recruited from professionals who have some special aptitude for leadership, and who have had some years of experience in professional practice. Courses at this level may often suitably be combined with schools or courses of management studies, staff colleges or the like. However here too IT makes a difference. Whether or not candidates for senior posts are to undertake specialist or advanced study of some IT topic (and there is often a case for this), the study of IT systems must remain firmly in the context of their use in information services. While it may be possible to teach management skills and sciences to such students in courses which include management candidates from other sectors of administration, the advanced teaching of IT should properly remain specific to information work.

Paraprofessionals are generally recruited at an educational level equivalent to school-leaving. The knowledge and skills they require are strongly based in practice, and involve instruction in the specifics of operating particular programmes and systems. This approach makes it suitable to train them together with students of similar level who are to operate systems in other industries. However the point made above in connexion with management applies here too. Information systems, whether technological or not, are specific to the information professions. Paraprofessionals should not be mere automata: they should understand the principles behind the systems they operate, and the aims which are to be achieved in their service. This means that their training courses should be planned and run quite clearly as aspects of information education. This principle would underlie any plan to run information training, at any level, in specialist institutes.

The question of numbers and level of students has to be thought of in this general context. There are other factors. One, already mentioned, is the likely supply of candidates who have appropriate aptitudes, and this refers back to the capabilities of the general educational system. Another factor may be the admissions policy and numbers control of the parent teaching

institutions, whether university or other; and this in turn may depend on the available resources of accommodation, and on the initial entry requirements.

The selection of candidates for admission at the various levels is a result of the balance of a number of interests. Debate continues, in many countries, on who is to have the main say in setting entry standards and on selecting candidates: the universities, the employers, the professional associations, or the training schools themselves. A training school should in principle have enough autonomy to allow it to select candidates on the basis of qualification and aptitude. The consequences of admitting unqualified or low-calibre students, or those without a proper aptitude or motivation, at an early stage (because the supply of better candidates is for the moment insufficient) are long-lasting. Admission procedures should naturally be set up in the light of the practices and traditions of the parent body. In general, it is a good idea not to admit students without a selection process which would for preference include a competitive entrance examination, aptitude tests and a personal interview. At the interview the student's personal motivation for seeking a career in one of the information professions should be probed. It is also necessary to find out whether the candidate would be able to work in a team, and would be likely to come to an understanding of the underlying theoretical framework of the practices he or she is to be taught.

If careful selection procedures like these are observed, the introduction of IT into information training should be a cause of improved morale in the training school, and improved public recognition outside. The greater cost of technological over manual methods means that there is likely to be greater accountability. The input of financial and manpower resources compels scrutiny and the constant evaluation of what has been achieved. This in turn would tend to improve morale among the staff, for, if the evaluation is reasonably sympathetic, it implies that society is placing a higher value on the service.

There are some more specific questions to be dealt with in connexion with planning student numbers.

Student numbers

There is no special feature in IT which would cause an alteration in the overall staff-student ratio which has been set as acceptable for the information school, its parent organisation, or the professional associations. The relevant IFLA standard is 1:12. The provision of hardware for practical teaching may be a factor which limits the numbers of students catered for, so that in this respect IT is likely to create a pressure for improved staff-student ratios.

Equally, IT has no special feature which would upset local traditions regarding the recruitment of students, their support

during training or employment after graduation. Teaching may equally well be full-time, part-time, or arranged as part of sandwich courses.

Generally, the principal factor in deciding student numbers is an assessment of the state of the market. The expectation of jobs, or the job requirement, may be estimated in the light of the number, size and variety of information services established on the ground, or provided for in the development plans in force. When the information systems deployed in the country begin to develop IT capabilities, they may be expected to call for an expansion in the number of information jobs available, over and above those needed to sustain the service in its traditional form. There will also be a demand for an expansion in the range of subjects taught in the information schools.

The case for taking on part-time students, who are released for periods from their regular work, may perhaps be strengthened when there is an important IT element in the training. In the early stages especially, there is often a barrier of incomprehension which must be overcome, before the students are able to appreciate what they are being taught, and even more before they are able to develop any degree of critical appreciation of it. If students are already working in systems which use IT, or which are being considered for automation, their appreciation can develop much faster, and they are able to look critically at the needs of the service. Problems of finding suitable services in which periods of practical study could be based, or where observation would be possible, would also be easier to solve. Part-time training might also minimise problems of financing and housing the students.

On the other hand, full-time students are better able to take advantage of the academic atmosphere which surrounds them, to absorb the theoretical basis of what they are learning, to make use of the library and other supporting facilities, and to undertake original studies. There is no doubt that a regular and efficient recruitment and training system for a national information service would be based upon one or more full-time educational institutions.

Information schools are not often entirely free to make a choice between full or part-time recruitment. The admissions policy may be dictated by that of the parent organisation, or by government regulation. Employing services may not allow for training secondments. There may be foreign students to accommodate, who, of course, would not be able to work at their own jobs during short intervals. Continuing education and retraining always make their demands. For these, distance and part-time methods are often the most suitable.

In reckoning student numbers, it will be desirable to work out traffic flows, by which the numbers of students going through particular courses at any one time can be charted. This aspect of educational planning is particularly necessary where there is

resource-sharing, or where retraining or other continuing-education courses are much in evidence.

Recruitment of both teaching staff and students should be considered in relation to particular courses as well as to the school as a whole. Each aspect of IT needs access to a particular skill: microreprography, word processing, informational computing, telecommunications, database management, expert systems, data storage. In the circumstances of developing countries it may be necessary to draw on expertise from international sources, perhaps by arranging for a sequence of short visits by experts.

Visits and demonstrations.

As with information training in general, access to suitable operational units is an important part of the curriculum. So too is the possibility and habit of running practical exercises for the students which may in some cases make use of operational facilities. It is in this area that students will be most exposed to "professional practice" elements in the curriculum.

The simplest way of using operational units in training is by arranging observation visits to them. There are many ways in which these visits can be planned.

Group visits, where classes of students walk round the plant with a guide are one way. If this method is used, an effort should be made to make the visit a learning rather than a touristic experience. There should be briefing sessions before the visit, at which students could work out points to observe and questions to ask. Debriefing and follow-up sessions afterwards can be used to consolidate what has been learnt and to develop a critical appreciation. In these circumstances, group visits can be made into a useful teaching tool, and a programme of visits could be extended into peripheral and specialist organisations (such as information services within business firms, technological specialist services, parallel cultural services such as museums, etc).

The attachment of individual students for a time to operational units is another possible method. In this case it would be desirable if the attachment could be planned by the teacher and the local staff in as much detail as possible. Assignments where students carry out simple tasks needed by the service should be avoided. It would be better for them to carry out a programme of observation and practice, worked out by the training school, which involves a critical observation of each of the different processes going on in the unit. There should be preliminary briefing and a subsequent report on work done and findings.

Attachments can vary in their objectives according to whether they occur early or late in the student's educational

experience. Attachments which are timed to occur at the start of a training course should have the main objective of giving students an initial impression, and some sense of the nature of the work environment and general aims. Attachments which occur later in the training programme would lay more emphasis on the objective of giving a practical aspect to the student's knowledge of particular services, or else of giving an initial contact with a new speciality.

Observation visits and attachments are devices which are also useful in the case of retraining or updating programmes.

Developing countries may find it difficult to provide operational units which can be used for this kind of visit, especially where IT is concerned. Operational IT units may not exist before the development of this type of service, or they may be in the early stages of development, or they may not have sufficient resources or reserves of experience to allow them to develop a teaching function. One sometimes finds a large element of the makeshift, or that the unit is seriously underfunded or that maintenance is insufficient. In these cases it is possible that the students' experience of them is flawed: it would be desirable to produce trained personnel who are able to evaluate critically their own country's achievement in IT, and its problems in developing the services; but equally it is undesirable to set up programmes which might give students the wrong standards or a sense of hopelessness in face of economic or infrastructural problems which may seem to them to be insoluble or inevitable.

One partial solution to this problem of setting observable standards, may occasionally be to send students abroad for their training in IT subjects. This is not, in principle, a desirable choice. IT should be an inseparable part of basic professional training, with an effect on all aspects of professional practice. Training abroad would normally be more appropriate to the formation of specialists.

For other entrants to the information professions, sending them to high-technology countries would have the advantage of allowing them to be exposed to a variety of operational units, and to receive training in schools which are well endowed with IT equipment and specialist staff. The drawback, as has often been remarked, is that the students then have an inappropriate experience, which may, on their return home, serve to reinforce their sense of the impracticality of planning to bring in comparable standards there. Equally it may fail to teach the right lessons. Theoretically students who have been exposed to the highest standards and lavishly (or even just adequately) funded enterprises should be able to come to a judgement on what they have seen. They should be able to use their experience to help them decide what features would be most useful in their home situation, and they should know how to choose those features which would be most suitable. Unfortunately this may not be the outcome, and anyone who has observed students from developing countries adrift in technologically advanced surroundings will appre-

ciate that it is not always easy to communicate good standards by this means.

IT subjects offer one further alternative way of bringing trainees into contact with operational systems. It is sometimes possible to arrange for representatives of manufacturers or of software houses to visit the training school and demonstrate some aspect of their products. Under proper conditions this can be a good device for acquainting both the teaching staff and the students with new developments. The danger, of course, is that the particular interest of the manufacturer concerned may be overemphasized. To counteract this, there should be an atmosphere of critical examination, backed by frank discussion of the system's capabilities and drawbacks. An important advantage would be that only systems which were supported in the country or region by specialist firms would be demonstrated.

Practicals.

Although students should be well grounded in theory, it is important that their experience of IT systems (and indeed of all professional systems) should be as practical as possible. To achieve this, the training school ought to look for as many opportunities to run practical exercises as possible, and the curriculum should insist on practical experience wherever this can be provided. Generally, practical experience, in the context of IT, means that students have operated the equipment themselves, and (where the situation is appropriate) run a small project of their own on it, under supervision.

This principle is as true in the area of reprographics as it is with electronically based technologies. Forms of multiple reproduction can sometimes be used in training school projects such as running a student newspaper or a series of occasional papers derived from postgraduate, staff or staff-student seminars. Microreprographics can be used in bibliographical or intelligence-seeking work. Practicals are sometimes also possible (and would certainly be desirable) in the management area, involving feasibility and costing exercises, and the planning of new investment.

Word processing exercises can be closely linked with professional studies, in the context of running the school's library, providing abstracting/indexing services, SDI, or records management reports. It is not suggested that students who are not already practised in keyboard skills should necessarily be expected to type their work ordinarily, and it is certainly not practical, as yet, to suggest that word processors should be made available for them to use in course work. However it is certainly appropriate for trainees in the information professions to be accustomed to using this means of preparing their work. If all student output is normally in longhand, that is an indication that the school and its personnel have not come to terms with the

nature of information services today.

Introducing students to computers offers many possibilities for limited practical projects. Student-archivists, going through an introductory course, may be asked to use computer facilities to produce a brief archival inventory, involving two levels of description, various forms of output using a sort facility, and various forms of indexing and searching (the software for these operations are generally available with an operating system). Other projects might include doing word counts and constructing thesauri. Projects should be closely linked with professional studies.

Comparable studies are available for librarians and documentalists. Compiling a bibliography or setting up a selective KWIC index suggest themselves as suitable tasks. Students of all the professions should accustom themselves to producing bibliographies and citation references in their essay work.

Telecommunications may offer less opportunity for original practical work by students, except in countries where the training school is based in a university which runs its own television/teletext services, or perhaps has a media or journalism training school. Where this is so, practical contact with videotape and visually based programmes would also be possible. Databases, however, should be more widely available, at least for observation. Since practice in search strategies and in the use of a command language are important features in IT training (and indeed in information training generally), an individual practical project using an online database would have a high priority in a training course. Sometimes it may be possible to do this within the school, using dedicated equipment or a local area network; but in some countries it would be necessary to get the co-operation of an advanced technical institute. A project with an expert system might be possible in the same way, though the element of originality would be less.

For students of records and archives management, practicals involving computer systems would certainly be feasible, provided that the school had access to suitable equipment. A microcomputer with a standard data management package would be sufficient. A minimum exercise covering machine-readable file storage and handling would be possible using the same installation.

It must be recognised that some parts of a full IT curriculum must in the end be based solely or mainly upon a theoretical acquaintance. The overall course period is never long enough; it is likely that even in relatively advanced countries the school will not have easy access to many technological services. Course planning ought to take account of this, and ensure that students do get a good grounding in theory, and good access to knowledge in areas outside their own direct experience.

A course in the data exchange formats, such as MARC, might be an area where this approach is taken. Students may come into

contact with the problems of these formats during other courses (for instance while using online databases), but for all but the most specialised a more intimate knowledge might be confined to a knowledge of the literature and of the general principles.

Access to forms of IT in the students' own personal lives is a great asset to an information training. Where students are accustomed to use their own personal computers, much of the burden of broadening comprehension is removed. One must presume that a time will come when most information students will have this kind of access generally. At present it must be recognised that even in the most technologically advanced countries students trained in the humanities often do not have this opportunity. In the less developed countries, of course, such contact is beyond all reasonable expectation not only now but during any directly foreseeable future. In these situations, the training school must fall back on its working relationship with operational systems in the country, and, conversely, it should be recognised that IT professionals in post (and indeed all information professionals) have a specific duty to assist in training schemes, and should allocate resources accordingly.

Teaching methods, attitudes and evaluation.

Curricula for information training has often stressed that an open pedagogical style is suitable. Formal lecturing, with an authoritarian style and where the students are relatively passive, is particularly unsuitable for professional formation. Consequently, it was noted above that rigidly furnished lecture theatres were less suitable than seminar-type rooms in which chairs and tables could be freely arranged.

The aim is to produce workers who can use their knowledge of theory and practice to evaluate systems, criticise past achievements and generally see where they are going. They should be able to solve problems and produce workable and economical plans of action; they should also be able to work together as a team for the common good. Teaching styles in the training school should therefore reinforce these attitudes. Seminar methods, practicals in which teachers and students work together, research enterprises in which students are involved, are suitable methods and approaches. An effort should be made to get some individual and original contribution from each member, teacher or student.

The professional bodies of the country or region have a significant stake in the success of training courses. Ideally there should be an opportunity for them to share in the evaluation of the success (or otherwise) of training courses, to help in planning curriculum developments and to help in setting standards of public recognition. This involvement is the more important in that professionals in post are so necessary in giving facilities for practical experience.

International standards; exchanges and communication.

Although the large (and increasing) gap between technological facilities in the most and in the least advanced countries is a serious difficulty, it is desirable that there should be agreement on a basic curriculum, a basic area of knowledge to be possessed in common between all information professionals. It is the purpose of the present guidelines to help this agreement to emerge. It is important that such an agreed view should be specifically endorsed by national and international professional bodies operating in the information field. This view is indeed recognised already, as can be seen in the series of seminars arranged jointly or in co-operation by the international professional bodies IFLA, FID and ICA.

However much an international agreement on a basic area of expertise may be discussed in the abstract, progress towards achieving it can only be made if there is a continuing and substantial programme of interchange and assistance at the international level. Co-operative projects between schools could be much improved, and international organs of information supply could be developed yet more. Communication between information training schools can be encouraged by arrangements such as twinning, or the expansion of Regional conferences. The possibilities of international exchange of teaching staff, or the provision of updating or retraining courses in new technologies are considerable. Idealists may even look forward to the day when information training schools may be linked by their own IT networks. There is no doubt that the appearance and development of IT offers stronger possibilities of bringing together the world's information professions, and their training ideas, than any previous development.

These possibilities should be borne in mind when programmes for the training (initial or continuing) of teaching staff, and continuing education programmes for information professionals in post are considered. Aims and objectives may include not only attempts to reach recognised international standards, but also to exercise existing standards of knowledge in practical interchange programmes.

4. Planning an IT training programme.

The discussion up to this point has largely concentrated on aims. It is only when there is agreement on the broad aims of a teaching project that planning can go forward in a more detailed and a more practical way. Objectives may be established by which particular parts of the course may be judged. The learning experience of teaching staff and students derive from the content and media of the actual courses taught. At the end there should be an evaluation, and an assessment of the degree to which the course has been successful in achieving its aims; and there should be feedback from all those who have been involved.

In working out the detail of what is to be expected of a training course, there are a number of pressures to be taken into account. These include:

- the students' own development (social, psychological, physical);
- the demands of the subject being taught;
- the needs of the consumer (government, industry);
- constraints imposed by resources and by the ambient culture;
- the competence of the teaching staff.

Course designers would have two over-riding questions in mind at the planning stage. They will ask:

"What do I expect that a graduate of this course will be able to do?"

and

"What attitudes would I expect such a graduate to show to professional work afterwards?"

Concentration on answers to the first question, which tend to direct attention to specific skills and areas of knowledge, should not let a proper consideration of the second be overshadowed. Planning the course continues by taking into account the actual subject matter to be covered: the course content. This helps to answer the first question, as to what students should be able to do. Course planners should then also consider the interests of students and staff, outside pressures from government, funding agencies, the professional associations and potential employers. Finally they should apply their knowledge of educational theory and of educational psychology. The result should be a curriculum which sets precise and realistic objectives, within the framework of the agreed aims, and produces self-reliant and capable professionals.

Mention of the interests of students must remind us that the level of training must make a great deal of difference to the specific course objectives, and to the way in which course aims are worked out in teaching methods, course content, and method of evaluation. Courses for senior management and for specialists must be based upon an expectation that such students are capable of organising their own studies and making original contribu-

tions. Courses for paraprofessionals must concentrate much more on mastering specific skills, but should also aim to impart relevant understanding of theory and a self-reliant approach to dealing with problems.

The subject matter of an IT course will be deeply affected by the availability of equipment, access to IT systems, and the general technological level of development. Nevertheless, it will broadly resemble the content of similar courses in any other country, and will be taught in a context of awareness of international developments in that field. The relative virtues of comparable courses can be assessed in terms of the students' performance within comparable services. The employability of graduates of training courses is something easily established (at least after the course has run a year or two); and the development of a worldwide information community is an aim which lies behind the development of information training.

Training schools, whether they are independent or whether they are included within a larger college or university, will not give totally effective support to the professions within their country unless they involve themselves in continuing education and in research. This bears upon the attitudes and interests of the teaching staff, and upon the load which the curriculum imposes upon each member. It is clear that this constraint is likely to have an important effect upon the curriculum design: the provision of a skilled and dedicated teaching staff is one of the most difficult for a school to achieve in its early years. Much support is needed from the professional associations and from manpower planners at this point.

It is also an aim of the course that students should be able to sit and pass examinations, and that the standard of these examinations should be recognised by competent authorities as being at a proper level.

The method of examination has a bearing both upon the educational objectives, the attitudes and capabilities of students and staff, and the general recognition of its standard. Traditional examinations are based mainly on written papers or upon oral presentations in answer to formal questions. IT subjects, which include both considerable bodies of theory and practical skills do not necessarily lend themselves to this method of assessment. Where individual projects which use the technology are possible, these can sometimes be used as the method of assessment, at once practical and embodying applications of the theory.

The interests of students and of the body of consumers - those who will in due course employ the student - can be considered when the course's target groups are identified. The present guidelines are based upon the assumption that there are three main levels of planning:

- -first professional entry;
- -the training of leaders for senior management;
- -paraprofessional training.

IT also presents opportunities and demands for other types of course, particularly the advanced training of specialists and the general retraining or updating of professionals in post. The school should also take its part in providing the manpower infrastructure for the national development of IT based services.

III. THE QUESTION OF HARMONIZATION

Havard-Williams and Franz, in their paper to the initial NATIS conference in 1974, pointed out that training for librarianship, documentation and archives made use of courses which had a broadly similar structure. Their analysis (p.19) suggested a structure containing three streams, representing information science, library studies and archive studies; and, running across these, five fields, which they named, rather whimsically, foundations, materials, methods, management and mechanisation. It may be noted that the last field, representing IT, was apparently entirely common in substance to all three streams. Apart from this element, they found that the specific content of the course components differed as between the three professions. Discussion of this paper tended to emphasise the difference between professional techniques and areas of knowledge, and it was not at first clear how in practice any real degree of harmonization was possible.

The 1979 meeting of experts examined this problem, and produced a list of subjects which would appear somewhere or other in the curriculum of all information training, and which would be suitable for harmonized treatment. The list was a long one, and is given in the first section of these guidelines. IT was one of the subjects, and a closer examination was given to it at the harmonization meeting held in 1984. This was the meeting which achieved agreement on the subjects to be covered under the heading of IT in the context of harmonized professional training.

IT certainly seems to be an appropriate area for a harmonized programme, for although each of the professions would use IT systems and services differently, the systems and services themselves are the same, and so is the body of theory which underlies them. IT training can only be considered in relation to the broader development of IT services in a country: its function is to provide the manpower element of a development intended for national use. This means that the benefits to be expected from it must also be considered at the national level, and the investment required will be more efficiently done if there is harmonization or at least co-operation between the information professions. The benefits should include, not only a more efficient use of the national investment in IT, but also a better and more generally harmonized attitude from the information professionals who run the services. Harmonized education is good in itself, as well as giving benefits from increased co-operation in expensive systems.

Since harmonization was first mooted, there have been experiments in several parts of the world which have tried it. The two training schools in Africa (in Ghana and Senegal) which were set up through UNESCO initiatives both relied upon it, and the two training schools which have emerged in the last decade as increasingly important for information development in large areas of the world - in Australia and Latin America - have both taken a

harmonized school of information studies as their model. It appears likely that the projected new school in Kenya will take the same line. Up to now none of these schools has shown a strong development in the technological direction. The most advanced information schools in the technological sense remain those in Europe and North America which are in most cases schools of librarianship, or of library-information sciences.

The harmonization of training courses does not imply that the information professions should in all circumstances be trained together, still less that the courses proper to each profession should be eclipsed in a common core. Two approaches should be provided for: schools in which all three professions are trained together in parallel courses, and in which IT training is to be embedded; and specialised schools for library, documentation or archival training, which are introducing or developing IT courses appropriate to themselves. It is clear that consultation on the development of curricula for both these situations should include the professional associations at national or Regional level.

It cannot be emphasised too much that IT courses cannot exist as independent or separate entities within information training schools. Because of this it is not possible to devise a totally harmonized set of IT courses: each aspect of IT is embedded in the professional practice of one of the information professions. Librarianship courses should deal with publication techniques, central cataloguing, expert and generalised databases, communication methods; methodology concentrates on the acquisition and control of materials. Documentation courses are more concerned with specialised databases, the worldwide supply of scientific information, and its dissemination; methodology concentrates on indexing and information retrieval. Archive and records management courses must deal with administrative control systems, provision of access to users and the management of machine-readable data; methodology centres on the construction and searching of lengthy textual descriptions. Each professional area therefore has a distinct sphere of interest, and within this sphere the technology is deeply embedded - both in general principle and in technical practices - in specific professional studies.

At the same time, the whole field described as IT must continue to be describable as a distinct body of studies based upon a distinct body of theory, with technological and practical aspects of its own, and a special vocabulary.

It is in the light of these observations that a harmonized IT course should be designed. Nothing that follows should be taken to mean that a distinct professional interest or technique should be suppressed in favour of a generalized technological view.

The different professions may have different requirements for the admission of students to IT courses, at the different levels. The levels visualised in these guidelines are five:

first professional entry
recruitment to senior management levels
first entry for paraprofessionals
recruitment to teaching posts in training schools
continuing education/retraining.

The effect of IT on career progress and career structures may also differ as between the professions.

First professional entry

Initial entry is at graduate level or its equivalent.

The IT components of a course in librarianship will be designed to run in close association with central professional subjects: classification, cataloguing, use of information sources, user services. They will ramify into management sciences, and into areas of open common interest with the other professions and with other disciplines altogether.

The IT components of a course in documentation may tend to reinforce the relationship of the information workers with the scientific community. Information sources, their management and dissemination are of course central to this training stream.

IT components in a training course for archives and records management also relate closely to central professional subjects: description of materials, user services, the management of materials and data produced by technological services.

All three professional streams should cover the area agreed to be the common basic range of IT training. This delimitation will leave further IT applications for specialised branches of the professions or for future development. There is great scope for specialised branches, which would include specialists in the management of database information services or expert systems; in visually based information services, or the development of local information centres. Specialised services for the supply of scientific or technological information are always being developed. The management of machine-readable databases, on a current and on an archival basis, is beginning to develop as a distinct speciality, which will be required in all countries eventually, and which may stand alongside other new specialities such as those which manage television, film or audio materials, or which may develop with electronic methods of publication.

Recruitment to senior management

Each of the information professions may have developed a distinct tradition in selecting and training people for posts in top management. Clearly the main element in selection will be personal aptitude and the main element in the training will be the management skills and sciences. IT however is likely to have a place.

One of the uses of IT is as a tool of management, and as a subject IT is at the centre of questions with which management must concern itself. The introduction of technology within a service confronts management with problems which can only be solved by learning new techniques and exercising judgement on the basis of what has been learned. Planning for technological development is not simply a matter of costing and feasibility exercises, it also demands knowledge of a system's capabilities, the

theory or system of thinking on which it is based, and practice in manipulating it technologically. Training for senior management therefore would properly include training in one or more of the IT subjects, at a level and with an approach which emphasises its use in management, and the use of management skills in appraising it.

Although there are some aspects of professional practice which remain distinct at this level, it is likely that management training in IT may be much more open to harmonization, or to teaching in common, than at first professional entry level. Thus a library or documentation manager may be much more interested in exchange formats or in telecommunications than the manager of archives or records services (though this would not always or necessarily be true), but all would be concerned with the IT aspect of internal management of their services, and with the provision of user facilities. All have a stake in the planning and development of national information services, and in general in using the principles of IT for the maintenance of their area of work.

First entry for paraprofessionals.

There may be a temptation to treat the training given at this level as purely instruction in a particular series of manual processes. This would be a mistaken approach. Paraprofessionals, though they would expect to be supervised in their work by professionals and by senior management, do in fact discharge duties which are in the professional area. Consequently their work will not be well done unless it is done with comprehension and with quite a strong degree of self-direction. Paraprofessionals also must expect to solve problems (albeit immediate shop-floor problems rather than planning problems), and to evaluate their own programmes critically. They should be able to make useful contributions to staff meetings at which the conduct and future of their service is discussed. Their training, including their training in IT, should be based upon this principle.

It follows that IT training at paraprofessional level should also be based upon a structure of theory, and should provide the student with an agreed basis of general information on IT applications. A basic course for paraprofessionals, therefore, could well cover the same general ground as that for professionals, but should be handled in a different manner. Teaching techniques should be aimed at giving a simple and direct understanding, but of the same services and technologies as those dealt with at the higher level.

Paraprofessional specialists will also be required. Probably in most cases paraprofessionals will tend to specialise in one or two of the systems included in the basic course: for example they may work with a word processor or in a microfilming program-

me. There will also be a need for more specialities than are provided for in the basic course, for example in supporting a public library issue system, or running the conservation programmes of a machine-readable archives service. These skills of course will have to be provided by specialist training.

Recruitment to teaching posts in training schools

The problem of finding good teaching staff for information training is very difficult in many parts of the world. Teachers of these subjects ought to be proven in experience as well as in academic capacity. In a developing country it may be a hard decision to withdraw such people from operational work in the national information systems, and devote them to training. However it is a good investment if this is done, for training is the key to all future development. But even if a policy based upon this value judgement is accepted it is often not easy to find the right candidates for appointment to teaching posts.

The same problem presents itself more acutely where IT is concerned. Effective IT training can hardly be established in countries where there is no effective technological information service in operation; but to establish effective technological services demands a supply of trained personnel. The temporary import of foreign experts sometimes provides a solution for the early years, but the problem remains, and often grows more acute. The local information community in the end must produce the right candidates for the teaching posts, or else information training is not established at a good level.

If training is not provided for, or is provided at too low a level, the national services inevitably will not be maintained and will fail to develop. If this is true of manual services, which can often be run at a very basic level, it is much more true of technologically based services, which demand investment and must be evaluated rigorously.

The recruitment and specialised training of teachers in the professional training schools is certainly a matter on which the information professions should co-operate. Despite the professional orientation which is insisted on in these guidelines, there is a great deal of IT teaching which can be done in common, and the investment of hardware and other facilities for the training schools should be made as widely useful as possible.

Continuing education and retraining

This aspect of professional training will remain essential in relation to IT, in all probability permanently. As new technologies and new services develop, the need to educate the existing information community in them develops also. In this context the information community means primarily information professionals but also to a considerable degree users as well.

Training schools in many countries have developed the habit of running summer schools or in-service courses to spread new expertise. Distance education has also been used in some cases, as well as other devices such as the inspection and re-evaluation of provincial or rural information services. To upgrade a service always involves a retraining programme.

There is a growing tradition in some professions that regular attendances at courses of continuing education is a permanent requirement for continued membership of the professional association or register. The growing importance of IT underlines the importance and value of this approach to the concept of professionalism.

The three professions will doubtless wish to devise and run their own retraining schemes, and it is likely that the professional associations have also a strong role here. Since people in operational posts can rarely be spared from the job while they do extensive courses, updating and retraining courses have commonly to be done in short intensive spurts. The training schools are used to this, and to the need to occupy vacations or other quiet periods with such courses.

The organisation and resourcing of these courses offer much scope for harmonized activity. In fact, it is probably quite feasible to arrange for continuing education programmes to be run in a harmonized way between the professions, even where initial training is still provided in distinct schools. Harmonization is itself a subject for retraining or updating courses, and may usefully be set in an IT context.

It would be hard to exaggerate the importance of regular programmes of retraining or of continuing professional education, based upon aspects of IT. The importance of these programmes is as great in developing countries as in regions which have acquired greater degrees of technological investment.

IV. THE CURRICULUM.

1.Scope and range of IT.

In establishing the range of subjects to be included in a basic IT course, the final report of the 1984 harmonization seminar (UNESCO 1984) is taken as the basic document. This is as yet the main occasion at which this subject has been debated internationally. All three professions were represented, there has been opportunity for further consultations with leading educators in the intervening period, and further consultations by the international professional associations have been carried out since. It appears therefore that there is sufficient agreement between the information professions on the 1984 statement for it to have acquired a resonable authority.

Within this context there appear to be three categories into which the various IT subjects can be divided.

1. Reprographics, divided in turn into administrative, publishing and microform reprographics.
2. Computerized applications, covering the various uses of computers and databases using verbal, textual or numerical information.
3. Telecommunication applications, based on the transmission of sounds or images.

This range of subjects represents a very considerable addition to the body of knowledge taught in training schools which have not adopted technological developments. Schools in the countries of high technology have shown that the addition of these subjects and more are certainly possible, but that there are costs in course restructuring, and in setting up parallel and elective courses, and in allowing for new specialisms.

The principle adopted in these guidelines is that there should be a central basic course which should include elements from all the subject groupings summarized above. This central basic course ought to be suitable for use as part of the general common or basic information training, at first entry.

It has already been argued above that the IT subjects should be taught in close association with strictly professional subjects, and not in isolation or as a totally common subject between the professions. This suggests that training schools should approach the question of introducing such courses in a radical spirit. The adoption of a basic IT course should mean an opportunity to restructure and re-examine the existing professional and technical courses, so that the new subjects are not so much additional to the old syllabus, as a set of catalysts which may cause curriculum designers to treat the old subjects differently.

The subjects included in the basic course should also be useful in structuring continuing education and retraining

courses, and in providing an infrastructure for specialist or more technical training.

The broad objective is to teach technological subjects in a way which will reinforce a professional approach. At each of the levels dealt with in these guidelines - professional, senior management and paraprofessional - the main need is to produce people who can manage and oversee a professional programme. It is not the concern of professional training (even at paraprofessional level) to produce technicians or operators. All courses therefore take their starting point and general orientation from management, and not from technical operation. Despite this generality, practical operation of a system is usually a necessary teaching strategy, necessary to full understanding.

Academic and practical elements.

As with traditional professional subjects in information training, there ought to be a judicious mix between the practical and the academic. There is a place for both, and there is no reason why there should be much of a conflict between them. The career itself, being a specialised vocational one, combines approaches which are academic with those which are practical.

The academic aspect is important because of the intellectual status of information science and its branches, and because of the status of the courses within the tertiary sector of education, that is as a training system producing postgraduates. The information sciences as a whole, and the technological sectors in particular, possess a body of theory which has active interfaces with other sectors of academic enquiry, and with the natural sciences. Those parts of the information sciences which are based within the humanities are also academic because they enshrine an important principle of academic procedure: the intellectual training involved in the assembly of relevant data and the evaluation of evidence from source materials.

In designing courses of training for librarians, documentalists, archivists and records managers, it is essential that these academic characteristics should not be belittled in the eyes of any of the parties involved - employers, colleagues, teachers of professional subjects, teachers in other disciplines, students, or the general public.

The emphasis behind this comment is given despite the well-known fact that the term 'academic' does not always imply universal admiration. The term can sometimes signify remoteness from the realities of daily practice, and this of course is precisely what a professional or vocational training should not be. Such a training must be intermingled with practical projects, and wherever possible all aspects of the courses should be reinforced by sessions of practical instruction.

The IT components do not offer any new characteristic here. Indeed they illustrate the distinction between theory-based and practice-based instruction quite well, and at the same time offer the chance of a happy blending of the two. Provided at least that suitable equipment is available, students of IT usually find that they can penetrate to an understanding of the theory only after they have struggled to master practical manipulation.

The problems involved in arranging practicals are discussed above in Part I Section 3, and more specific suggestions in connexion with each course module are in Part IV.

Local curriculum development.

It was always envisaged that training schools would develop their own version of any curriculum. This local version would of course reflect local training needs, as well as the teaching strengths of the school. IT introduces no new principle, except that as it depends on expensive investment within the national plan for information services, the need for linking technological subjects with the specific needs of the service is greater than with manually operated services.

Course development planning.

Basic training for first entry to the professions should nevertheless be balanced. It should complete the students' education to postgraduate level, and besides the professional skills involved it should provide as much educationally or academically useful knowledge as circumstances allow. Library students, for example, could reasonably look to their basic training as an opportunity to complete the general education in literature and science which enables them to take their place in public or special library services. Documentalists need to have a wide scientific understanding in order to be of use to research. Archivists need a strong background in higher education not only to take part in research programmes and to relate to their users, but also - perhaps pre-eminently - to allow them to carry out programmes of appraisal and disposal of records.

Balance is achieved in educational planning by analyzing the subjects to be taught, and organising them into clusters of modules. Modules can be put together to make varieties of courses, aimed at different target groups. In each case there would be a central core of compulsory subjects, and the possibility of electives.

Examinations and validation.

The question of examination method was discussed above in Part I Section 3. Some IT courses suggest themselves as suitable for examination by non-traditional methods:

- by presentation of a student dissertation or original project, including the products of direct contact with an IT system;
- by assessed course work which includes an element of supervised practical work;
- by oral examination or multiple choice paper.

These options are looked at in relation to specific courses: see Part IV.

The conduct of the examinations should be overseen by an appropriate academic body, and the papers should be moderated by examiners of recognised status. These could well include, in some circumstances, representatives of the professional associations. It is necessary that there should be some publicly recognised warranty that the standards reached in teaching and in examination are at a good academic level. Failure to establish this would be an important contributory factor in continued low status for the professions.

2. Course modules.

As explained in Part III, these guidelines are concerned with the design and introduction of a basic training in IT which would form a central and harmonized part of the training of information professionals at three levels. It is of course recognised that IT has ramified widely with the development of technological services and that over the world there is a growing number of technological specialisations. These guidelines are not concerned with the training or career structure of specialists. Even so, it is not possible to consider the design of a basic course for career entrants without thinking about how specialist choices would affect it.

It has also been pointed out that particular training schools will make decisions on their attitude to IT teaching which are based upon their knowledge of local conditions (especially the demands made by manpower planning and by consumers) and upon the teaching resources available.

To cope with these various uses, the guidelines therefore offer an analysis of subjects into modules, which can be combined in various ways to build up a suitable overall course. The coding and numbering of the modules is intended to assist this. Modules are kept small and self-contained as far as possible, to assist the construction of composite courses.

In general, all information professionals should be acquainted with the principles of reprography, should understand its aims and uses, the use of the most common types of equipment, the storage of the materials, and the best means of retrieving information from them. Students should emerge from their training with the habit of watching for new developments and of considering the application of these to the service in which they work.

Each of the professional groups has a distinct area of interest. Librarians may be chiefly concerned with the various methods of publication, book production and distribution. Documentalists may concentrate upon the transmission of documents and the use of finding aids which relate to particular reprographic methods. Archivists must deal with the management of records generated by administrative systems which use forms of reprographics.

Within the area delineated by these particular interests lies a body of knowledge which can be treated as common between the groups, and this would contain basic knowledge on reprographic practice. Because of this it is possible to recommend that a basic course in reprography should be planned and taught entirely in common between the professions. If this is done, the course would ignore the special interests of each group, but would contain discussion and analysis of the different special interests during the course of teaching. There would also be a need for consideration of the implications of reprographic systems within the distinct professional subjects of each profession.

A broad analysis of the subject area is as follows.

Administrative reprographics

Document copying is a technique used by administrations everywhere: including of course the administration of libraries, archives or documentation services.

At its most advanced end, with multiple xerography and laser printing, this technology has caused important changes in the production of information-bearing media, including books, and contains suggestions of further radical changes to come. It has transformed traditional methods of book and newspaper production, and has blurred the distinction between documents internal to an administrative system, and published documents.

By doing this, the technology has also blurred a traditional distinction between the three professions: books are no longer

necessarily a class of media clearly distinguishable in form and method of production from other classes of media; technical documents may be generated and circulated within a system but also penetrate into wider information networks; and therefore records managers may find themselves considering the use of administrative repropgraphic facilities to disseminate such documents. These activities all cross traditional boundaries between the professions.

On the other hand, less developed countries have not been able to invest in the most advanced equipment, and may find that one of their most irritating difficulties is that of getting documents copied and distributed. This factor may be one of the most important in establishing good and well-recognised information systems.

In line with the general principles behind these guidelines, the recommendation is that trainees should be given an understanding of the general nature of administrative reprographics in all the forms which have become standard over most of the world, and practical experience of those forms which are available locally.

Microreprographics

Microforms are used both as administrative systems and as a means of document production and distribution. As with administrative reprographics, their spread has tended to blur some of the traditional distinctions between published and unpublished media. All the professions must come into contact with these systems in one way or another, and a basic course must deal with all the aspects noted.

Microforms as administrative systems are of direct interest to records and archives managers, since in them media are generated directly in microformats. Such systems are of direct interest to all three professional groups as a means of management of the service.

Microform systems are also used for the security or preservation of information and therefore also have this double interest. They produce media which must be managed by information professionals (and not only by archivists), and they are information management systems which may be used in the running of information services.

Microforms are used in reference services in all three professions, and there is an element of user education involved.

Publication and transmission of materials in microform is a normal practice. It bears particularly upon less developed coun-

tries since so many materials which have to be sent through the post are now reduced to microform. Lack of equipment may slow the progress of this development, but it is clearly one of great interest to many less privileged countries, and knowledge of the technology must be important to them.

A basic course of instruction might contain the following elements:

- the planning and costing of microfilm programmes. This is the most essential element of the course, for the ability to establish aims and compare the implications of methods is basic to the formation of a professional.
- the selection and preparation of materials to be treated in a microform programme.
- processing materials through the system; this involves important management techniques.
- checking and storing microfilms produced by the system.
- retrieval of information from microforms. There are advanced specialised technologies available here which may not be appropriate to less developed countries, so that course planners may decide to set the boundaries of a basic course at a relatively simple and practical point.
- reading equipment and user service.
- maintenance and supply. Maintenance is generally a vital element in any technological service, and the obviousness of this is greater where photographic methods are involved. The term includes not only the physical maintenance of the hardware, but also sustaining and managing the processing part of the system: this means provision of chemicals, maintaining their quality in store and in use, testing the quality of output, and checking the content and readability of the materials.
- evaluation of the programme. It is particularly here that a knowledge of international standards is needed.

Students completing the course should emerge with a broad knowledge of the main forms and processes, and should know how to access the sources of updated knowledge on these. They should be able to get technical and specialised advice from appropriate advanced centres. Most importantly, they should be able to manage the conservation of microform materials.

Publishing reprographics

Although nearest to the sphere of interest of the librarians, this aspect is useful also to documentalists and archivists. Both may need to use the technology in running their service, and both may have to deal with the products of it when managing documentation produced by a technical means. A basic course might include the following elements:

- knowledge of the main formats and processes: offset lithography, multiple xerography, physical typesetting (this is still relevant in many countries, though it may not be used any longer as an administrative programme), computer typesetting, laser printing.
- planning, costing and evaluating publication programmes. This aspect links with user studies.

Levels of instruction

Each course or module has its own target group. These groups may belong to different levels: professional, senior management or paraprofessional. At each of these, the aim of the course is to produce people who can manage and evaluate programmes appropriately, rather than to produce operators who only know how to manipulate hardware. Within this generalisation, there are important differences of approach at each level.

Professional first entrants without much special preparation ought to be capable of understanding the underlying theory, the technical principles on which a system operates, and the principles by which a technological service must be evaluated. Practical experience is intended to reinforce and make real this theoretical understanding. It is useful if knowledge of information sources can be wide, and integrated with other professional courses. Practicals should include an examination of systems in operation within their administrative context.

Professional training concentrates on the skills and information needed to plan, cost, manage and evaluate a technological system. Detailed technical knowledge of the hardware, consumables, processes and processing standards and product are necessary, but the orientation should be towards management of personnel and materials within a planned programme with objectives and provision for testing.

Senior managers are those who must carry out the essential process of assessing and deciding on the adoption of new technological (and other) systems. Their comparative knowledge must therefore be wider, and their ability to analyze and evaluate must be based upon real experience.

At this level, one can perhaps assume that the trainees will be people who are experienced in professional life. The extra skills required for senior management will be either connected with management skills (such as personnel selection and control, systems analysis, or budgeting), or with the development of particular technologies. Courses should aim at both of these.

Paraprofessionals are much nearer to practical operation than either of these. However it is assumed in this study that paraprofessionals belong to the professional rather than to the technical or manual-operative area, and that they will be responsible for the proper running of some part of the service, inclu-

ding parts of technologically-based services. They need an understanding of how technological systems run, including an appropriate knowledge of theory. This knowledge, always dependent to an important extent on practical experience, must necessarily be very strongly based on practice.

In view of this, training at paraprofessional level may concentrate on the working of specific programmes and systems. Students should be left with a clear understanding of the principles and standards to be applied, and of how and why a system of regular tests must be maintained.

There are four areas within this category:
1. Word and text processing;
2. General computing;
3. The use of databases;
4. Data storage technology.

Word and text processing

It might be argued that this category is simply an application of general computing. In view of its development in the form of distinct systems, and particularly as distinct systems in administration, it was felt that it could best be considered as a distinct component of the basic course.

The course should cover two distinct aspects: the application of word processing automation in general administration and in the production of media there; and its application to the running of the information services themselves.

1. In general administration, the course covers the production and updating of documents. Methods of recording information on disks in preference to paper lead on to consideration of paperless office systems and communications. Teleconferencing and the disposition of word processing networks in complex organisations have implications on the management of resources, and the siting of information sources. This area is most directly applicable to records management, but has important implications for documentalists.

2. In the administration of information services, these processes are relevant to all professional groups. The technology has been used to manage acquisitions control, the construction of catalogues or finding aids, running abstracting or indexing programmes, producing output for dissemination, the storage and editing of search results, and circulation control.

Word processing, as a specific and usually well packaged application of microcomputer technology, is more widely spread round the world than more generalised computing applications. The less developed countries have, of course, been less exposed to it than the technologically advanced countries, but even there these systems have made their appearance at least in parts of the private sector. It is important for information professionals to realise the practical and theoretical implications of this technology for their service. At the lowest level, it means that the typewriter - hitherto standard equipment for even the poorest equipped information service - is obsolete, and (to say the same thing in different words) unacceptably uneconomic. At the highest level, the implications of text management as a tool in information work are basic to any forward planning.

A basic course in technological information management might well therefore be based upon a study of word processing systems, with practicals (or at least observation) based upon particular local applications.

General Computing.

An introductory module for basic computer appreciation could be devised which would meet the needs of countries with minimal existing investment in computers, and could easily be justified, even in this case, in terms of its value for teaching fundamental concepts.

A course like this could include a survey of the main general principles, concepts and terminology of computing, in so far as they have affected professionals who work with computer installations. It might include some acquaintance with the principal forms of hardware (mainframe, mini- and micro-computers), and of relevant common software packages. Looking closely at the latter gives scope to introduce discussion of the special software requirements of information processing, transmission and exchange.

Practical aspects of the training could be covered if students could carry out simple standard procedures with the keyboard, such as logging-on, displaying the user's directory, using the operating system to create, edit, copy, merge and search files. It would be ideal if students could see and use terminals in operation. Integration with the professional courses could be based upon consideration of data structure, and the format, content and naming of data files.

This degree of teaching access to computers may well be regarded as idealistic by information training schools in some countries (though the writer's experience in Ghana suggests that difficulties of access can often be partially overcome). It may be useful to point out that some of the benefits of this course can, in theory, be obtained without access. It is possible to run a course aimed at developing 'pre-computer skills'.

A course of this kind would concentrate on the intellectual analysis of data processing and information transfer, so that when the computer arrives, the preliminary adjustments to ways of thinking and terminology are not strange. The analysis of work flows, setting out processes by the use of flow charts and decision plans, drawing up a scheme of technically accurate objectives and system requirements are all professional jobs which are antecedent to computer work but which do not depend on having a computer there. Well designed, such a course could be very valuable even in the entire absence of computing facilities; but of course it must gain enormously in credibility and relevance if it can be taught on a practical basis.

In any case, the principles and factual information in it link closely with traditional professional courses. For librarians knowledge of developments like MARC, for documentalists the principles of Boolean logic, and for archivists the structure of data files are all examples of how computing concepts and language have penetrated pre-existing professional disciplines.

If it is agreed that there can be a basic course in computer concepts, language and appreciation, and that this links closely with professional courses, the question then remains on what further courses can be usefully offered by venturing further into this very extensive field. Each training school must make its own decision on this, depending on its professional orientation, local facilities, and the state of the market for its graduates.

A somewhat more detailed course in general computer appreciation for information professionals could easily be devised. This might include an analysis, including practicum if possible, of a relevant software package. Bibliographical systems or database management systems are widely available where there are computing services, for example in universities, and either of these could be used. Where possible, more specialised systems could be used. Operational systems exist in many parts of the world for the control of processing activities within a service, circulation or readership control, the ordering and accessioning of materials, catalogue production, and information storage and retrieval.

Students should be left with some acquaintaince with the format and characteristics of computerised records. They should know what is meant by magnetic disk and tape, optical data disk, and COM; and all information professionals should have some knowledge of the storage and handling requirements of these media. The appraisal and archiving of machine-readable data, its accessioning and some of the conditions of its use extend beyond the archives/records management sector into other information services - another example of the blurring of traditional professional boundaries.

It would be reasonable to expect all information workers to have some knowledge of the methods and scope of the principal international standards and widely used networks or systems among library, information science and archives services. RLIN, OCLC, INSPEC are all examples of leading international systems of interest to all three professions. Choosing the most relevant of these well-known systems must be left to individual schools, which will judge which are the most relevant and accessible.

Some information training schools in the technologically advanced areas have adopted the custom of teaching some students the practice of programming in computer languages. This skill must always be needed by specialists, and information workers in general must have some openness to developments in computer languages and programming practices. Learning to write original programs is a valuable intellectual training, and provides a

skill which can often be useful in an information context.

However, most information schools do not include programming in their curricula, and these would point out the difficulties of including extra material within the usual constraints of time and resources. It would certainly be inadvisable to advocate a programming course in situations where computers remain remote from the students' daily experience. In countries where students may be expected to own a cheap personal computer, and where they have relatively easy access to other facilities such as television and telephone, the immediate value of programming skills may be put higher, especially if the programming is approached in the context of a particular database system.

In general, it seems likely that at the present time most information educators would probably agree that programming should not form part of a general or basic course, but that the concepts which underlie it should be taught, as far as possible, in the computer appreciation module.

The Use of Databases

Online databases form a natural category for a distinct module. Using them is part of older professional subjects (information environment and sources; bibliography), and their transmission is part of the wider subject of telecommunications. They exist in large numbers and are on offer to information services all over the world. Many information services are in the process of setting up new databases to cover specialist areas, and there is considerable interest in the creation of local databases. It has been estimated that the number of database services which can be accessed by participants grows annually by 30%.

Here too there is a situation in which the less developed countries, especially those with shortages of hard currency reserves, are being left behind. Even so, information practitioners in these countries have a need as great as that of their colleagues in more developed areas, to understand what is on offer and how it may be developed or utilised for their own national development. Local databases offer the possibility of a particularly suitable component for this.

It is hard to imagine a national information system today which does not seek to make provision, eventually, for access to certain online databases (for instance in medicine or agricultural chemistry) and for the development of some local ones. Trained manpower is a necessity for these developments, and the training covers an area of expertise which ought, in general, to be present in the whole community of information workers.

This module should also be taught in as practical a way as can be managed. It might contain four main elements, as follows.

1. **Command languages:** learning and using a system command language is something that must be done before a database can be used. Unfortunately there is little correspondence between the conventions of one system and another, so that the choice of database and associated command language is an important one. The exercise may involve getting students to work across a natural language barrier, and this in turn may have implications for the wider curriculum.

Students will not be able to exercise their knowledge of command languages unless they understand other basic principles of database use: the structure of bibliographic or other descriptions, the structure of a data file, and the way to construct search strategies. It is assumed that these subjects are taught in the basic module, or in the professional subjects.

Searching databases exercises skills which are derived from professional subjects in the training course, but offers opportunities for practical application. Simulation packages can usefully be used both to exercise these skills and to obtain familiarity with a database.

2. **Database management systems:** these systems are now widely available on all types of computer, and knowledge of how to use them is a valuable extension of knowledge of how to get at information in national or international databases. They also involve mastering a command language, but the particular importance of this area of study is in the structure and relationship between data files, and between these files and the managament of organisations.

3. A **survey of existing databases;** the principle of encyclopedic, bibliographic, abstracting, textual, numerical and other databases, their source and coverage, conditions of participation and critical evaluation. **Expert systems** ought perhaps to receive distinct attention in view of their possible rapid development as immediately useful additions to public information services. This part of the module links closely with, or may be contained by, more traditional courses in the professional area. Since there are now online databases operating in the fields of librarianship, technical and scientific information and archives, this knowledge is desirable for all professional workers.

4. Some acquaintance with the design and use of **local databases** is likely to be appreciated. Local information services using these can be of the utmost value, and setting them up is often the result of the personal initiative of an information professional. The greater availability of microcomputers has made the practicality of local databases much more obvious. Creating a local database, either as part of an operational service, or as a simulation exercise, might well be something within the capabilities of a training school.

Data storage technology

All information professionals, and not only archivists, may need to understand the physical and system requirements for the storage of electronically produced media. Without this knowledge there may be drastic losses of data caused by ignorance of basic procedures. The most usual material is magnetic tape, but hard and soft disks, digital and optical data disks are also met with. It is probable that in future archival retention will be by means of optical data disks or similar hardware, but even when this technology has penetrated the market, there will be many less formal ways of keeping information for short or medium term use.

Instruction could include surveying, appraising and documenting materials. Previously these subjects were regarded as purely of interest to archival management, but it is no longer easy to restrict them to a single professional field. Every computer-based service has an archiving facility, and every automated system must have a technologically compatible successor every few years.

The distinction between transmitted information based on written words or text and that based upon spoken words or visual images is growing less precise. Methods of storage and transmission are frequently similar, though the distinction between analog and digital methods underlies many recent technologies. Patterns of use of all these services are developing fast.

In the context of information services, IT first began with systems which used numbers, then were extended to include text. Increasingly today hardware and software provides facilities for the use of graphics and sound. Other technologies of the information revolution, such as television, which were originally based upon visual images and sound, have now spread themselves to include the transmission of textual information, and the linking of sound, vision and text. There are input and output devices which use sound as their medium (though it is true that these are not yet common in information work). The telephone link, by now a traditional medium perceived as an audio channel, but technologically an analog system, is in the process of being transformed. By associating it with computers and using digital methods of data processing, the link can be used to display sound, images and facsimile text. Digital data storage devices also include text, images and sound recording. Since all three ways of conveying or storing information can thus be handled by electronic systems, the distinction between them has become less important as a principle of defining information service, and therefore less important as a distinction between elements of a basic training course.

Despite this, recent years have also seen the development of new branches of the information professions based upon media which specialise in particular modes of communication. Information specialisms exist to deal with such media as film, sound recording, and video recording, and each of these is now supported by professional associations, national and international. As usual, training provision tends to trail behind the development of the work itself, but such training also exists in some countries. Clearly these specialist branches will continue to need specialist training. The problem of providing this does not necessarily affect the problems of providing basic training in IT, except of course that in some cases the same hardware would be used.

The aim of the guidelines is to devise a basic course in IT which covers the essentials of non-textual transmission and storage, and would give the main body of information professionals a workable link with the specialist professional branches. An important function of this part of the training would be to give information professionals a sense of common purpose and the ability to respond imaginatively to technical development in associated media. The basic training should also provide a

starting point for the training of specialists.

Less developed countries may find this area the least immediately relevant of the fields mentioned in these guidelines, and may also find it the least easy to organise courses in. For these reasons they may be tempted to avoid it in basic training and treat the area instead as an elective. In countries where the telephone service is unreliable and thinly distributed, where television receivers are rarely held by more than a tiny minority of individuals, and the electricity supply is limited and untrustworthy, the development of information services through electronic outlets will be slow. If we are to consider the use of microcomputers acting through television networks, future development may often seem very problematical. However, telecommunications networks are taking shape very rapidly in developed countries, and have penetrated into the homes of individual members of the public. Financial and banking services are moving into the area, and will be followed by other domestic support services. It is clear that there would be dangers in omitting knowledge of these media and systems from the training of professionals even in the least developed countries.

A wide range of technologies exists, from which course designers can choose. There are microcomputer networks within organisations, or among specialist groups: with these one may observe an expert system, or an administrative method. Alternatively, the range of subjects might include international data transmissions by way of earth-orbiting satellites.

The uses to which the data can be put also covers a wide range, and there are many possible interfaces with professional courses. The skills involved can include searching catalogues or databases, transmitting facsimiles of documents, or disseminating information selectively. The implications of all these developments are so far-reaching that they will have an effect on all aspects of professional training.

Information scientists are the group most immediately and directly concerned with this part of the IT spectrum, and they are the ones most accustomed to using advanced telecommunications at present. However, library networks are increasingly common. Archivists have often taken the view that remote online access is not a high priority for their services, but online archival networks do already exist in North America. The experience which will result from this development, and the growth of planned information systems and of systems for the management of current records in the private sector will lead to changes in this assessment of priorities. There will be a need for archivists and records managers who are to work in organisations which use technological media. Traditional attitudes in all professional sectors are also influenced by changes in the cost of new technology, and here rapid development usually follows reductions in cost.

It should be repeated that all aspects of IT should ideally be linked with national plans for the development of information services. There should be a measurable demand for the expertise, and the possibility of specifying in which technologies it will be most needed. It is within this context that training schools can devise the best means to mount their courses.

It is possible to think of ways in which simple practical courses can be given using equipment and services which are available, granted that there is an element of national planning involved. Microcomputer networks using cable have the virtue of being independent of exterior services; those which use the telephone system do of course depend on an exterior public service, but one which may perhaps receive a relatively high development priority from governments. Large-scale computer networks, and teletext need specific support from government, but simulations, or small-scale exemplars often exist in specialist areas. Universities in less developed countries often have communication studies studios, with television equipment. The private sector, or specialist institutes for research, industrial or agricultural development can sometimes be found which operate technological information systems for themselves; the military may sometimes be in the same group. Training institutes do not always find it easy either to come to terms with the idea of working with such institutions, or to persuade the institutions to provide facilities for training, but the effort should be made, and in the end it is the national interest, as expressed in public documents such as the development plan, which will determine the matter.

At the least, students of the information courses should have a theoretical knowledge of international developments, what are the relevant international standards, and how to access the relevant information sources.

3. Course construction.

In the discussion so far, little attention has been paid to the special features which may be needed for training for particular branches of the information services, or for the different levels. The basic needs of paraprofessionals are not identical with those of members of the mainstream information professions. Either group may have specialists, and senior management staff will also probably have provision for specialization. Career structures (and hence aspects of training provision) may provide for promotion from one grade to another, or for movement between specialist services. There is also the continuing question of updating and retraining courses, which will presumably be needed at all levels as well.

These guidelines are based upon the view that it is theoretically possible to construct a central basic training course in IT, which will to a large extent be relevant to all branches of the information professions, and which will serve as an initial basis or jumping off point for specialist training in particular cases. However every local situation is different, and in any case different courses will have to be set up for different training schools, for different professions and at different levels. The solution to the problems posed by these complexities is to establish a set of modules which can be used as building blocks by course designers.

All courses need some practical element, and the broad nature of this is indicated in each case.

All courses link closely with other professional courses. The nature of this link is indicated, but there will be difficulties of interfacing which can only be solved locally.

A. FOUNDATION COURSE (IT).

It is assumed that a foundation course providing elements of general education would normally be provided as part of the information training courses in general. The function of this element is to fit graduates to take their place as citizens and as experts in an important field of public service. Additionally it should provide the infrastructure of knowledge and skills which will allow the information worker to become an active member of a team.

The function of a foundation course which belongs specifically to the IT sector is to provide a framework of knowledge and habits of thought which will help to make the more technical courses more intelligible, and allow students to develop a view of the world and society which will accommodate their new intellectual alignments.

The team of which the trained information worker will be a member, is likely to be one working in a scientific speciality. In this team information is one of the technical areas which have to be provided for by team members. The information worker must also know enough about the general objectives and working climate of the rest of the team, to allow reasonable decisions on questions of information supply. It is not reasonable to expect training schools to provide instruction specifically on the special subjects dealt with by research or scientific teams of this sort, but they do have to prepare students for the day when they will join a team and have to work up the subject. A general educational foundation and a foundation of a more technological kind are both necessary preconditions.

The content of the foundation course is determined in a negative sense by the subjects given in the general professional curriculum, and in a positive sense by what is needed to support the technological courses to be followed. For example, units such as the following may be provided in the general foundation course, or elsewhere:

- theory of communication
- principles of information retrieval
- bibliography, sources of information
- principles of data structure and the classification of information
- history of technological information service
- theory of data processing
- theory of computing

These therefore constitute linking points with general education, and with the general foundation element of professional education, and they suggest points which might be covered in an IT foundation course.

Objective

To supplement general foundation courses or general education, in order to provide the broad educational background needed by information workers in their user communities. In the context of IT, those aspects of general education which are concerned with the fundamental principles and significance of technological systems are stressed.

Modules

A.1	Theory of communication:	elements of the philosophy of language, epistemology, semantics; the theory of channels of communication; terminology and concepts.
	[See also D.1]	
A.2	Survey of IT applications:	general knowledge of the current state of IT technologies, their taxonomy in terms of techniques used, and their applications in society, industry, government and related institutions; sources of information on these.

Practicum

Observation visits to related institutions, such as museums, archaeological projects (concentration on the information collecting and organising aspects), retail trades (stock control systems), research institutes.

Follow-up study: devise information management system for a small institution within the student's experience.

Target groups

1. Professional first entry:	A.1; A.2
2. Paraprofessional:	A.2 (with appropriate weighting)
3. Senior management	Probably not useful
4. Recruitment to teaching posts	A.1; A.2 (with organising responsibility)
5. Continuing education	Probably not useful.

Evaluation

Traditional examination with written essay questions would be quite appropriate here. Questions would be broad and deal with the significance for organisations and for society at large of the information systems within them, and the likely effect of information systems on major areas of activity such as research,

manufacture, distribution, government.

Alternatively, course work based upon the practicum would be appropriate also.

Debriefing should include evaluation by students.

For groups 3-5, formal examination might be omitted, but care should be taken to elicit discussion of observations during later studies.

Weighting

This should be a short component, at the beginning of the course, and occupying only a few hours during the first few weeks. A suitable format might be:

- Lecture + briefing	1 hour
- Observation visit	half day
- Debriefing	1 hour
- Lecture.	1 hour

Resources

Reading and reference material in the library; film or video presentation.

B. REPROGRAPHICS.

Objective:

to give a sound practical and theoretical knowledge of the main reprographic systems in use, and their effect on the work methods and philosophy of the information services and professions.

Associated courses in professional syllabus:

copyright law, book production, document storage and retrieval, records management, systems analysis.

Modules

B.1 Administrative reprographics:

Reprographic systems used in the administration of organisations, including libraries, documentation services or archives considered as organisations.

B.11 Methods of document production:

This part of the course deals with the way documents (i.e. books, scientific papers, records) are generated and what factors are involved in determining their format. Records management and systems analysis are associated professional courses.

B.12 Methods of document reproduction and dissemination.

Techniques and technologies involved in making copies of documents (single or multiple) and in ensuring that copies or descriptions reach actual or potential users. Associated professional courses are book production, dissemination of information, information retrieval, user studies.

Specific systems covered:

Photocopying
Xerography
Internal print
Collation and dissemination systems.

B.2 Microreprographics:

Technologies involving the creation of miniaturised images of documents, by the use of photography; most commonly microfilm, or microfiche, with their variants.

B.21 Planning and costing systems

How an organisation should determine on the introduction or continuation of a microform system, and how to determine what its costs would be.

Specific subject areas:

- -Systems analysis: analyzing the organisation's systems and assessing its needs.
- -Records management: assessing the function of a microform system as a means of managing the records; and/or managing microform records as products of an administrative system.
- -Comparative information: information about comparable activities in other organisations or countries; information about comparable systems and technologies; professional judgements on the systems.
- -International standards: knowledge of relevant ISO or other standards of operation.

B.22 Hardware for microform programmes

- -Technical information about hardware and systems available, their makers, maintenance programmes and needs, costs.
- -Assessment of systems: using systems analysis to design parameters for proposed systems; comparing alternative systems.
- -Maintenance and supply: how to maintain a system in operation; management and cost considerations.
- -Testing and standards: international or external standards of operation; continuing evaluation of the system; costs and techniques.

B.23 Subject materials for microform programmes

- -Selection of materials or data for inclusion in microform programmes; objectives, requirements.
- -Treatment of materials: preparing materials to be microfilmed; costing and managing the resources necessary.
- -Information retrieval criteria: planning the retrieval of information from microforms; running a service using microforms.

B.24 Processes in microform programmes

-Management of processes: techniques involved in making sure that the processes are carried out in due time - selection, preparation, copying, checking, proof-reading, storage, dissemination, etc; assembling and using the resource needed.
-Technical processes; quality control: the technical and scientific information needed (e.g. specifications for silver halide film); sources of information; international standards.
-Output formats and their treatment: knowledge of the different output formats (e.g. microjacket, 16mm) and their uses.

B.25 Storage and use of microform materials

-Error correction: techniques and problems involved in discovering and amending errors in mircoform text.
-Management of storage: international standards for the storage of microforms; techniques for storage and retrieval of the material.

B.26 Information retrieval from microforms

-Organisation of the materials: how to arrange, display, catalogue and make available microforms.
-Indexing microforms; self-indexing arrangements (where materials lend themselves to this, e.g. named case files).
-Technological methods; computer assistance with the creation or retrieval of microforms.

B.27 User services from microforms

-Reading equipment.
-Access; multiple and remote access: use of microforms as a form of publication.
-User education requirements; policy of using microforms as a part of the service to users.

B.28 Programme evaluation

B.3 Publishing reprographics:

The technology involved in the publication of duplicate materials, such as books, journals, scientific papers, information generated by the information system (newsletters, finding aids, lists of materials, etc).

B.31 Hardware and systems used in publishing services (including in-house services suitable for information services):

-Typesetting
-Offset lithography
-Multiple xerography
-Computer typesetting
-Advanced printing methods [links with electronic publishing]

B.32 Management of publishing programmes

-Planning, costing, evaluating services.
-Making the case, assembling resources, maintenance, user relations.

Practicum

Observation visits to administrative centres, and sites of operational programmes, including places where users have access to microform materials. Inspection of the technical systems should also examine links with the administrative system connected with it: for example, the composition and dissemination of committee agendas, minutes and reports. Microform programmes should include observation at all stages: preparation and planning, input of materials, checking and processing of materials, output and user services. Publishing methods should involve both commercial and in-house publishing facilities, a knowledge of which is useful for all information professionals.

Follow-up studies: analysis of document generation in the administration of the university or training institute; evaluation of the aims of a microform programme in different branches of the service. Discussion of book/document production links closely with other professional courses.

Target groups

1. Professional entry	B.1 B.2 B.3
2. Senior management	B.1 may be useful for short course B.2 for in-service or short course B.3 may be suitable for this, but less generally
3. Paraprofessional	B.1 may be valuable for all entrants as foundation B.2 for appropriate groups B.3 may be suitable for all entrants, or as a speciality
4. Teacher recruitment	As for group 2.
5. Continuing education	Suitable for in-service or short courses B.3 should be considered in connexion with electronic publishing, or to stimulate in-house publishing programmes.

Evaluation

This type of course is best examined by non-traditional methods:

B.1: Course work: essay or seminar contributions.
B.2: A project consisting of the study of the potential of microform programmes in the context of a student's own service may be possible.
B.3: Course work.

Weighting

B.1: Short module. Format

-Lecture and briefing	1 hour
-Observation visit	half day
-Debriefing/follow-up.	1 hour

B.2 Substantial module. Format

-Lecture and briefing	1 hour
-Series of observation visits (different stages)	3 half days
-Debriefing/follow-up	1 hour
-Practical studies	students' time

B.3: Short module: as B.1

Resources

B.1/2/3: Reading material in library

B.2: Access to hardware and systems, especially those for user services (microforms and reading equipment)

B.1/3 Access to operational systems in publishing firms or in-house publishing departments.

C. COMPUTERISED APPLICATIONS

Objective

to give an understanding of the principles of operation of computer systems, the terminology and concepts embodied in the working of these principles; and to give the students such practical knowledge of appropriate applications as will allow them to evaluate computer systems in their professional areas with confidence and an informed critical spirit.

Associated courses in the three professional syllabi: publishing, book production; sources and exchange of information; professional processing (classification, cataloguing; arrangement, description; data formats and structure); information retrieval; user services; management; records management.

Modules

C.1 Word and text processing

This module would seek to impart a knowledge of the current state of the art in machines and systems which accept data in the form of text, and which are able to manipulate the textual data, principally with the objective of producing readable hard copy, but also for the purpose of retrieving information from it.

C.11 Hardware and software

Knowledge of machines and programs in operation, in immediate prospect, and those which are available and practicable locally.

C.12 Word processing in organisations:

Knowledge of systems for producing readable textual documents, considered as part of the methodology of managing an organisation. In this part of the module the emphasis is on organisations as such, rather than as information services.

- -Document production and recording: how documents are generated in an administrative or professional system, and how they are stored and retrieved.
- -Paperless office systems: administrative systems which aim to abolish or reduce the use of paper as the main medium for recording.
- -Networks: electronic systems which provide communications in a system by linking a number of terminals, thereby removing or reducing the need for arrangements to move documents physically from one work station to another. a number of terminals
- -Planning and siting: the procedures involved in deciding where to site work stations in a system, and how the system is to work in that particular

organisation and in that particular physical setting.

C.13 Word processing in information systems
Knowledge of systems for manipulating text, considered as a component of an information system or service.

- -Acquisitions control: using word processors as part of the system for dealing with new acquisitions of material.
- -Catalogue production: as a means of producing or organising the catalogue (or the principal finding aids).
- -Abstracting, indexing, information dissemination programmes: the ways in which the manipulation of text can be used to arrange, retrieve and use data.
- -Other services.

C.2 Computing
[See the introduction to Part IV for a discussion of the limits to be set to the computing knowledge to be dealt with]. The objective here is to give a theoretical and practical knowledge of computing, as related to the professional processes, and to the hardware and software likely to be available locally. Care should be taken not to allow the teaching of computing to spread into subject areas which are not relevant to professional information work, or which are quite unrelated to the local plan for the development of information services.

C.21 Principles, concepts and terminology
This part of the module deals with the infrastructure of theory which the student is to use as a means of understanding and evaluating practical systems.

- -Types of hardware: the principles on which types of hardware are distinguished and the effect of these differences on their operation.
- -Types of software: a similar approach, based on an analysis of the different conceptual approaches to the design of information software; system philosophies.
- -Software specifically for information services:
  Systems for data recording (e.g. for constructing catalogues or finding aids);
  Systems for data transmission: sending information about holdings, or about contents of holdings, from one place to another;
  Data exchange formats; MARC: ways to standardise data so that international or regional exchanges are possible;
  Search strategies; Boolean logic: the way in which the contents of a database can be con-

structed and put to use; this relates closely to similar parts of the professional courses.

C.22 Basic skills

The physical and mental skills required for operating a computer system.

- -Keyboard skills
- -Practical use of a system
- -Editing and searching files: a practically-based course component aimed at giving the student first-hand experience in tackling the problems of:
  - Data structure: deciding how to arrange the data elements in a finding aid system;
  - Format, content, naming of data files: how to operate the data structure within a real system.

Analytical skills: the intellectual skills used in these processes.

- The logical breakdown of processes in an operation;
- Flowcharting: recording the sequence of logical processes.

C.23 Computing for information services

Computing applications specifically for information work; consists of surveys of systems in use or in prospect, but with as much practical contact as possible.

- -Software for bibliographical work
- -Software for information management
- -Software for stock control (if relevant; e.g. relational database management systems).

C.24 Computer records

The ways in which computerised data is stored.

- -Hardware: magnetic media, optical media, COM, CD
- -Appraisal and archiving of computer records
- -Computers in records management, i.e. as systems for the production and recording of administrative information, and as an administrative system.

C.25 International computer information systems

The approach generally should be to deal only with systems which are available or practical locally, but in this section there is an opportunity to give at least a general knowledge about what is happening in information systems elsewhere in the world.

-Hardware
-Software
-Existing and projected information networks

C.26 Programming

[See the discussion earlier in Part IV]. If programming is to be taught, the orientation should be towards using it as a way to understand the principles underlying information systems, or to control and use an information system or process locally.

-Choice of high-level language
-Program construction and evaluation
-Practice output.

C.3 Databases

This section seeks to give the student a theoretical and as far as possible a practical acquaintance with the use which is made of databases in the world. The section covers both predesigned databases (e.g. bibliographic databases issued by national or international organisations) and database systems which can be used or manipulated locally.

C.31/2 are foundation subjects for C.33/4.

C.31 General

The basic knowledge required to understand the subject.

- Types of database
  - Encyclopedic
  - Bibliographical
  - Abstracting
  - Numerical, statistical
  - Full-text
  - Expert systems
- Survey of relevant databases
- Methods of transmission

[Data structure: see C.22]
[Search strategy: see C.21]

C.32 Command languages

How to find relevant items in a database; how to evaluate the command language as an important factor in choosing the right system.

- Choice of system
- Practical exercise
- Evaluation of aptness of command language.

C.33 Database management systems

Theory and practice; systems which store, retrieve and interrelate data in an organisation.

- Types of system: numerical, text, derived from business uses, mainframe and micro versions.
- DBMS in administration: the uses of systems in an organisation [see C.12]
- Practical exercises
- Evaluation of systems for suitability.

C.34 **Local database systems**

Knowledge gained can here be put to practical use in the local context.

- -Hardware requirements for setting up a local database
- -Software requirements
- -Selection and processing of materials for inclusion in a local database
- -Practical exercise
- -Evaluation of the success or otherwise of a local database.

C.4 Data storage technology

This section deals with the way data is stored for medium or longterm use in electronic media, and with the way in which information professionals must deal with it.

- -Hardware for data storage:
  Storage media (magnetic tape, digital data disk, etc);
  Hardware for management (tape evaluators, tape cleaning, etc).
- -Surveying databases held in machine-readable form; appraising it for retention values; documentation required for putting it to use over time [links with records management].
- -Storage requirements for maintaining machine-readable records;
- -Access requirements for using machine-readable records.

Practicum

C.1 is based on observation visits, with the usual preparation and follow-up.

C.2 contains both theoretical and practical matter. C.2 constitutes a specific foundation course, and may be dealt with by theoretical instruction.

C.22 is entirely practical and demands a high degree of access to hardware; practicals here are certainly best done on the training school's own keyboards if possible.

C.23/24 may rely on observation visits.

C.25 would be improved by observation visits but may if necessary be treated theoretically.

C.26 if adopted requires access to computing services; many training schools avoid this module, or reserve it for specialists.

C.3 follows the same pattern, though C.31-2 are necessary foundations for C.33-4.

C.31 is a theoretical foundation.

C.32 is entirely practical, and requires access to a terminal; however, this may perhaps be easier than C.22 to run on a resource-sharing basis.

C.33/34 are improved by observation visits if possible.

C.4 would be improved if observation visits were possible. These may be to major computing installations in government or industry, or in broadcasting services.

Target groups

1. Professional entry	A minimum would be C.13, C.21/25, C.31. A moderately full course would be C.1, C.21-25, C.31-32. A full course would be C.1-3. C.4 is suitable for archivists and specialists.
2. Senior management	C.1-4 may be suitable for particular courses. C.22,26 would suit upgrading practical courses. C.12,23-24,33-34,4 are suitable for special training as a basis for promotion to managerial positions.
3. Paraprofessional	C.11,21,31 would provide foundations for particular courses. C.12,22,32 provide practical training for particular services. C.26 provides a practical course for those with aptitude
4. Teacher recruitment	C.1-4 cover the field for those working in the speciality. Upgrading courses may be selected from the range.
5. Continuing education	C.11,21,31 are theoretical foundation courses. C.12,22,32 are practical introductory courses. C.26 is a practical course for those with aptitude. C.4 is available for archivists and specialists.

Evaluation

The theoretical courses C.11,21,31 may be examined by traditional methods, such as written essay questions. The practical courses C.12,22,32 and C.26 may be examined by the submission of output from project work. Other courses may be suitable for examination by course work based upon observation visits; course work may include simulations, designing local applications or individual dissertations. Seminar teaching method is appropriate.

Weighting

The whole field represents an important new component in information training. Introducing it may involve reconstruction of pre-existing courses. There are many implications within traditional professional subjects.

C.1 is a quasi-independent set of modules, which may be given greater or lesser weight according to the immediate objective.

C.11 provides a foundation suitable for all courses, and may be treated as a short component similar to B.1.

C.12 would receive more weight in a course for archivists or records managers,

C.13 in one for librarians.

The whole set is nevertheless suitable, at least in a brief treatment, for all information professionals.

C.11	1 hour + visit
C.12	1 hour + visit
C.13	5 hours + visit and practical exercise.

C.2 contains a range of possible choices, though this too covers a coherent field of studies of value to all information professionals, and is linked very closely with central professional subjects.

C.21 is the theoretical foundation, which may stand alone as a minimum, when it would constitute a semi-independent short component.

C.22 is a direct extension of the theoretical foundation into student practice.

Taken together, these two modules would form a substantial course component.

C.23-25 may be added as providing important knowledge and a context for new skills, each being a single short course component.

C.26 is a substantial additional element, with a practical basis, which is usually treated as a specialist option.

C.21	3 hours + observation
C.22	5 hours lectures 10+ hours practical exercises Practical exercise or project with at least 1 hour personal tuition.
C.23	1 hour
C.24	2 hours + observation
C.25	1 hour
C.26	10+ hours + practical project

C.3 also contains choices.

C.31 is the theoretical foundation,

C.32 the practical extension.

Taken together these are a substantial practical-based course element.

C.33-34 add important professional knowledge and assist the student's ability to relate it to local circumstances.

C.31	2 hours + observation
C.32	1 hour + practical exercise; but the weight of this section depends on the weight given to C.22,26
C.33	1 hour lecture + visit + practical exercise + evaluation.
C.34	1 hour lecture + extensive practical exercise + evaluation.

C.4, though directly most valuable to archivists and records managers is of value to most information professionals. It covers an area of knowledge of increasing importance. It constitutes a semi-independent short course component.

C.4 5-10 hours.

All modules would be suitable for continuing, advanced and updating education.

There are three recommended formats:

(a) courses taught as theoretical foundation: C.11,21,31
- -Lecture or seminar
- -Evaluation

(b) courses based on practical exercises: C.22,32,26
- -Briefing
- -Practical exercises
- -Students' own output
- -Evaluation

(c) courses using observation visits: C.12,13,24,25,33,34,C.4
- -Briefing
- -Observation visits
- -Debriefing, follow-up
- -Seminar
- -Evaluation

Resources

Reading material in library and bookshop, includes user manuals.

For practical modules, access to hardware and software, with support services.

D. TELECOMMUNICATIONS APPLICATIONS

Aim

to create or enhance the student's sense of belonging to a world college of information professionals, using world-wide networks of data transmission which are of great interest to the wider community.

Objective

to give a theoretical familiarity with the principal systems in use, backed wherever possible by practical experience.

Associated courses in professional syllabus: communication theory in information retrieval.

Modules

D.1 Foundation

This is the essential part of the module, aimed at giving an educational grounding which would accompany an ability to understand working principles of the systems, their significance in society, and an imaginative view of their potential.

D.11 Theory of communication

[Links with specific professional studies]. The body of theory which underlies human communication in general and the passage of messages through telecommunication channels in particular. Technological detail is not sought here.

D.12 Types of system:

- -Digital and analog systems
- -Networks using either, or both, including those which use microcomputers in association with the transmission channel.

D.13 International survey of systems

General knowledge of telecommunication information systems in wide use.

D.2 Telecommunications systems and networks

- -Hardware: telex, telephone, TV channels, data transmission networks, telefacsimile transmission, automatic document delivery, modems; reliability, noise.
- -Digital and analog technologies, conversion from one to another.
- -Survey of systems in operation with emphasis on local systems.

D.3 Use of telecommunications for information services.

-Connexion to library networks: significance for the information services.
-Applications, with emphasis on any systems in use locally (e.g. commercial databases) or those which would be capable of being developed locally.

D.4 Specialist services
Broad knowledge of services using advanced or specialist technologies.
-Audio
-Video
-Film.

Practicum

The best situation is one where the training institute has direct access to some of the services dealt with: teletext and telephone-linked services. The next best is access to some of these services through facilities in the university or governing organisation, perhaps in connexion with media installations. Below this comes observation visits to operational services where these systems are being produced. Finally, the lowest option is visits to points of user access to the services.

Wherever possible, student practicals should include an individual assessment of the potential or actual value of the service to the local situation.

Target groups

1. Professional entry	Minimum is D.1 D.2-3 are important D.4 may be treated as compulsory for librarianship or as a specialist subject.
2. Senior management	D.1-4 or any of them at a suitable level or as a specialism.
3. Paraprofessional	D.12 as foundation D.2,3 where relevant D.4 for specialists
4. Teacher recruitment	As 2, or may be relevant mainly to specialists
5. Continuing education	All modules relevant.

Evaluation

D.1 should preferably be treated as a whole but may well be regarded as part of the general IT foundation course.

D.11 is suitable for examination on traditional lines, especially in association with linked courses in the pre-existing syllabus.

D.12-13, D.2, D.3 require examination by course work, including if possible individual work by students on assessing the potential of the service to the local situations. D.4 (which may be compulsory for librarians) may be treated as an informational survey or as the basis for specialisms.

Weighting

D.1 group of modules is a theoretical and educational component of importance. It should receive emphasis in the overall structure of the syllabus, though of course it may be treated as part of a pre-existing subject area. Courses which have not emphasised these subjects in the past (some librarianship courses and archival/records management courses) should give it more prominence.

D.2-3 are linked modules which should probably be taken together in most cases, consisting of semi-practical subjects. D.4 may be included in this group, unless there are specialist courses available.

D.1	5 hours
D.2	2 hours + observation
D.3	2 hours + observation
D.4	1 hour + observation

Resources

Access to production points of relevant services, or at least to points of user access. Wherever possible, hardware in the department.

Library resources need a good supply of recent journals.

Course construction using the modules

There are at least six possible types of course for which provision might have to be made:

1. First entry at professional level
2. Career development:
   recruitment into senior management
   entry into technical specialisation
3. First entry for paraprofessionals
4. Continuing education:
   refresher, updating, retraining, conversion
5. Training for the establishment of a new information service
6. User education.

Each type of course can be based upon a suitable mix from the list of modules. Generally, a course will consist of a certain number of compulsory modules, taken with the possibility of electives. The relationship of the IT course with associated professional courses must be considered carefully. Courses will be composed of theoretical and practical instruction, and the management of practicals demands careful planning. The method of instruction also demands planning, and may include the use of dissertations, pilot studies or model construction, as well as straightforward communication of information. Examination and validation choices should include an element of evaluation, so that courses may be improved from year to year.

1. Courses for first entry at professional level.

General foundation and education, as well as the principles of professional practice are normally provided in existing professional courses.

Specific foundation for the understanding of IT and the management of its services would be provided in compulsory modules:

Foundation A.1-2
B.1
B.21
C.11
C.21
C.31
D.1

All these modules are designed to have practicals wherever possible. Generally these consist of structured and well organised observation visits to operational systems, with introductory briefings and follow-up activities.

The IT foundation courses are designed to provide a practically-oriented but essentially theoretical understanding of the range of subjects. After this, training institutes may decide to proceed to the next stage of development, which depends on the availability of hardware and supporting services. This stage involves the adoption of a number of new central and compulsory modules, each of which requires the student to undertake practical work on the keyboard:

C.22
C.32

When this stage of development is reached, it would be difficult to avoid incorporating certain other modules into the central core subjects. The following might therefore be considered for inclusion in the compulsory area:

C.23-25
C.33-4

Remaining modules appear to be suitable for treatment as electives, which should be designed to fit the approach avenues to careers in information services. There are usually a variety of careers which are regarded as broadly within the general ambit of the mainstream information professions. It is these which are aimed at rather than outrightly specialist careers. The modules which provide this type of elective are:

B.2
C.26
C.4
D.1-3

Training for each of the three professions may require a choice of modules which reflects the different professional interests.

Training for librarianship would suggest a course made up in this way:

Compulsory	Elective	Specialist
A.1-2	B.22-28	C.26
B.1	B.3	C.4
B.21	C.12-13	
C.11,21,31	C.23-25	
C.22,32	C.33-34	
D.1,4	D.2-3	

Training for documentation would suggest the following course makeup:

Compulsory	Elective
A.1-2	B.1
B.2-3	C.26
C.1	C.4
C.21-25	D.4
C.3	
D.1-3	

Training for records management or archives administration would prefer a course makeup like this:

Compulsory	Elective
A.1-2	B.3
B.1	C.25-26
B.2	C.31-32
C.1	D.1-4
C.21-24	
C.33-34	
C.4	

These analyses omit several important factors, and tend to suggest that there exist certain important sectors of IT which are by their nature outside the area of professional interest of one or more of the information professions. This suggestion would be false. Although at present certain IT-based information services are not used, or not widely used, by certain of the information professions (and indeed are not familiar in many countries) the situation is changing rapidly, and individuals within all the professions must use their knowledge to respond to technological facilities which they can bring in in support of their service.

2. Courses for career development.

(a) recruitment to senior management.

Such courses need to be tailored to the circumstances of the place. They will doubtless include a strong element of management science and skills. If there is no element of retraining involved, the place of IT training may be either to provide a working knowledge of the overall possibilities in IT, or to give the candidate a specific knowledge, in some depth, of one or more systems. In any case, the small number of such candidates and the specific nature of their recruitment mean that generalised courses are not likely to be needed. Specific and personalised lines of study are more fruitful, perhaps being done by means of a dissertation or personal enquiry under supervised conditions.

(b) technical specialisation.

The situation here is rather comparable to that mentioned above. Where a number of technical specialists for recruitment to a specific service is in question, then a course structure is needed.

However there is a difference between (a) and (b), since technical specialists are not necessarily interested in the skills and sciences needed by senior management. It may be practical to use existing modules as the building blocks for their training course. IT subjects may also serve as part of the

training of specialists whose speciality lies outside technology, or even outside the academic boundaries of information science.

3. Courses for first entry, paraprofessional level.

At this level, principles should be dealt with simply and clearly, and the practical aspect becomes dominant.

Among paraprofessionals, the meaning of specialist training is probably different from the meaning it bears at higher career levels. This is because paraprofessionals tend to concentrate their work upon smaller ranges of activities, and the services which employ them may well decide to tailor the training provided to the most appropriate subjects. It would not be unreasonable, therefore, if the concept of the compulsory core and elective extras were to be abandoned in the case of paraprofessional courses. These could then be made entirely elective, students opting for the particular modules that suited their work situation.

Course designers should however note that paraprofessionals have an important need for a good general education, and for a range of knowledge which will allow them to have a reasonable understanding of the working principles behind the systems they operate, some idea of its objectives, of its place in the information system and of its place in society. It would not be a good idea to allow paraprofessional courses to become too narrow and too much confined to the most relevant subjects. Courses may be centred upon these subjects but should be rounded out and balanced by other subjects which are either complementary to the relevant subjects, or which have a broad educational purpose.

In the same way, it is often the most practical way to set up a group of compulsory core subjects, because these will give the kind of understanding which is needed to support other, more detailed or more specific tasks. All subjects should be based on practicals, which should be used as the basis of course assessment or examination. A core curriculum for paraprofessionals would include:

A.2
B.1
B.22,24,25,26,27
B.31
C.11
C.21
C.31
D.12

[Courses should of course be treated at an appropriate academic level].

It may perhaps be useful to add some suggestions as to modules which might be particularly suitable for paraprofessionals who belong to the different professional areas:

Library	Documentation	Records Management	Archives Administration
A.2	A.2	A.2	A.2
	B.1	B.1	
B.22	B.22	B.22	B.22
		B.24-7	B.24-7
B.27	B.27	B.27	B.27
B.31	B.31		
C.11	C.11	C.11	C.11
C.21	C.21	C.21	C.21
C.31	C.31	C.33	
D.12	D.12		

It is interesting to note that the subjects in the above list which appear as being held in common (A.2,B.22, B.27, C.11, C.21) together constitute the core of a subject which might be called the information technology for a practical man.

4. Continuing education.

Many refresher, updating or retraining courses are carried out in short bursts, students being released for training periods while they are still in post. Alternatively, courses can be arranged on a longer term basis, the students being seconded to the training institute from their place of employment. In either case, course construction must of course take account of what is already known, and what is needed to be known because of technological development. Methods of study and teaching must be carefully planned and be appropriate.

In general, the modules suggested in the present guidelines contain sufficient material to provide the basis for a short in-service or post-experience course aimed at introducing experienced professionals to new technologies. Naturally, modules may be linked together to provide longer courses covering more ground. The most natural of these linkages are into the main subject areas (A,B,C,D), but interesting and coherent courses could also be devised which adopted linkages across these divides. For example, the following might be possible:

A.1-2	or	B.	or	C.2-3
C.2-3		C.1		D.1-4

Many other combinations of varying length are possible.

Courses for paraprofessionals can be constructed in the same way. Since there is a practical bias in all these courses, the main difference is in teaching style, and perhaps in the breadth of subject covered in any one period of time.

The harmonized approach is particularly suitable for continuing education. Course administrators can offer a sequence of short or long courses, according to local possibilities, which may be taken up by personnel (at the appropriate level) from any of the professions. All modules have something of relevance to members of each profession, and practising information workers can benefit from in-service or post-experience courses even where these do not concentrate directly upon their own speciality. They will gain from the new learning experience, contact with their colleagues in the other information services, and will be able to use their experience to reach a judgement on what aspects of the subject do indeed have an important bearing on their own work. IT has the additional quality in that it often offers an avenue of career development which is somewhat outside the predicted and traditional avenues. The way into these new ways is through attending sessions of continuing education.

5. Training for the establishment of a new service.

Provision should be made in the planning for the new service, which will demand predictable numbers of trained entrants at various levels of performance. Introducing a rounded training facility in IT into an educational scene which hitherto has avoided it, means the introduction of a set of courses complete in itself.

The curriculum set out in these guidelines attempts to provide a coherent and rounded training course such as would be required in this situation. The nature of the technologically-based services which are to be introduced will no doubt affect the courses adopted. It is clearly not necessary to include the B courses (reprographics) where this aspect is not the subject of the new technology (in fact these are usually services which already exist in most countries, at least in some form).

6. User education.

The introduction of technology brings many problems in the training of users. User education has in the past largely been left to the information professionals who run the service in question. When this service becomes technological, the kind of instruction that users need becomes different in kind, and there may be need to set up institutional training courses. For example, instruction in the use of search strategies may be needed where IT-based services provide for searches directly by users. Naturally such training ought to be geared directly towards the needs of specific users in connexion with specific services.

None of the modules in the curriculum are intended to be suitable as they stand for user education courses. Such courses, even though they may cover much of the same ground, should be designed with a proper objective in mind. At the same time, it is worth remembering two points:

- information professionals should emerge from their training with the ability to instruct and help their users; course elements should therefore exist which will help them to structure user education in connexion with each of the IT services;
- teaching IT may often be done on a resource-sharing basis even if this means that students in the information courses share certain lectures or practical sessions with students from other academic sectors. Educators will be aware of the dangers of this as well as its advantages.

General

It is worth repeating that none of the course options presented above should be taken directly at their face value. Each country, each training institution, each professional group has their own order of priorities, their own perception of the needs presented by the arrival of IT. The relationship between the new subjects and the old subjects of central concern to the professions must be worked out according to local needs and feelings. Methods of teaching, practicals and examinations must conform to local traditions and suit local needs. Course directors must of course plan their work in accordance with what they see to be necessary.

What should be insisted on is that the subjects which IT has brought with it are now a necessary part of education for the information professions. Its arrival has blurred the distinction between the professions as traditionally perceived, without taking away the specific rationale of each. IT has brought with it reassessments of the nature of the professions and their ways of operation, a new terminology which goes with a new way of perceiving traditional operations, and a new possibility of service.

Difficulties of investment and technological support have meant that IT has made slow progress in the less developed countries,. but it has made its appearance there, and since IT carries with it global implications, it is no longer possible to conceive of an information professional who has no knowledge of IT services and their possibilities. These guidelines are an attempt to suggest how a basic training programme could be shaped and fitted to existing training provision, and in particular how it could be done in a harmonized way.

SUMMARY GUIDELINES

Introduction

These guidelines form part of a sequence of documents, beginning in 1974. They arise immediately from meetings in 1984, at which proposals for the harmonisation of training between the information professions were elaborated.

Each of these professions - librarianship, information science, archives and records management - should continue to use and develop the curricula for their own education and training, but information technology is one important area which may form the basis of a common course.

The IT course contains much material (both practical and theoretical) which can be regarded as common, but at the same time IT concepts and practices deeply affect the essential subjects of professional training in the three professions. IT training should therefore also be integrated into these subjects.

The question is posed whether there can be a single worldwide standard for training in IT, while there are such glaring differences between countries which are the most and the least advanced technologically. After discussing the question, the guidelines end by advocating a single basic standard of knowledge. This could be assumed as common to all information professionals, whatever level of technological development may be current in their country.

Infrastructures

IT makes its appearance within the information systems of a country. Its development is frequently uneven, and areas of advanced technology can coexist with areas where manual methods are used. One function of training courses may be to bring these together and establish norms.

Recognition by public opinion is always necessary to the health of information services. When IT is brought in, more specialised user publics appear, and aspects of user education should form part of the training of information professionals.

Information training also depends on the general educational system of the country. The appearance of IT on the curriculum may alter criteria for accepting new entrants, and may alter public perception of the nature of the work. This again is affected by the degree of penetration by IT into society generally.

IT brings with it new skills and new ideas about what knowledge is; visual literacy becomes important, and should be a strong element in the training curriculum. IT-readiness is some-

thing which comes in the course of national development. The training courses should be ready to respond to it.

IT training at the three levels visualised - professional, senior management and paraprofessional - should be given its character and goals by a general plan for manpower development. Training which includes IT as an essential element may well demand that entrants should display more strictly defined aptitudes than traditional information work has done, and applicants should be tested to see whether they have these.

Local difficulties and cost in the less developed countries may suggest that IT training should be given abroad. The disadvantage would be that this may give students inappropriate standards, and may prevent the concepts of IT becoming closely integrated into students' perceptions of their professional duties.

The institutional setting

Setting up IT courses presents training schools with technical and financial problems unlike those experienced by traditional courses. These problems reinforce the argument for concentrating such training within broader institutions like universities, where there can be resource-sharing and the construction of harmonised syllabi.

The layout and character of teaching rooms used in IT courses should permit a flexible and open teaching/learning style. Reprography demands a workshop or laboratory with an ongoing programme of work, and good maintenance. Teaching laboratories may usefully be shared.

IT courses bring with them the need for better support services - security, maintenance, learning resources. There may be a need to develop these resources in association with future development of the information services in society.

Teaching requirements

Training schools which teach IT will normally seek resource-sharing arrangements. In particular, there will be a need for students to observe working programmes in operation. This applies, for example, to reprographics and to computing.

Many other observation visits may be needed, often to see peripheral or special aspects of the main topic. Students studying word processing should observe office communication systems and a variety of computer applications. By this means, students can be given a broad contact with operational IT services.

Observation visits should be structured and supervised as full teaching exercises. The attachment of students to IT ser-

vices for a period is a possible device, including attachments to services abroad; but in this case, relevant standards should be taught. Assistance from the commercial sector is sometimes possible.

Practical teaching should be used as much as possible, and this may involve sharing the use of hardware, setting up local networks, and learning to use software systems and databases. Students ought if possible to have easy access to terminals. Early planning for the replacement of equipment and systems is necessary.

It is necessary to recruit and train teachers of IT. Teachers should if possible be experienced professionally and should also be academically qualified. Where suitable recruits are difficult to find, the alternatives are to use the part-time services of professionals in post, to use the staff of other technological departments, to set up a training scheme using expatriates, or to recruit and train as teachers some able but inexperienced personnel. In any case, a programme of continuing education and retraining is always necessary.

IT training should always be planned in association with the IT services in society. The numbers and level of students admitted should be considered in this context. Care should be taken to see that quality is maintained, and that numbers relate to the job market foreseen.

The orientation of IT teaching should always be practical, and as far as possible integrated into training for professional services. A knowledge of the body of theory underlying IT is certainly necessary, but can usually only be realised by the use of the system in practice.

Teaching methods should aim to produce self-reliant professionals capable of solving the problems that they are likely to face. This demands open teaching styles. Examinations should have a high standard, should be generally recognised as valid, and should involve national (or sometimes international) professional bodies. Non-traditional methods of examination may be appropriate for some of these subjects.

Course planners will aim to inculcate attitudes as well as skills. The attitudes and skills of the teaching staff are also important, and often derive from the research they are able to carry out.

Harmonisation

Harmonisation between the training courses of the three professions is desirable in itself and has been adopted in principle in recently founded training schools.

The courses leading to entry into each profession should be designed independently and on appropriate principles. The various aspects of IT are deeply embedded in the distinct professional areas of study. Nevertheless, IT does represent a separate academic and practical field, with a new terminology, and a considerable body of theory. IT can therefore serve as one of the common connecting points in a combined information training school.

Harmonisation presents different problems at each level of student entry:

(a) First professional entry, at graduate level, concentrates on linking basic IT knowledge with professional practices;

(b) For senior management as aspect of IT may be used as the basis of a management course;

(c) First entry for paraprofessionals should cover more than practical instruction in specific skills. Paraprofessionals also do professional work, at the level of execution. They should know enough theory to understand how to make things work.

In addition, IT may be a feature in training teachers in information schools: for this, practical experience abroad may be a suitable method.

Continuing education and retraining are always necessary, at all levels, particularly in view of the constant development of IT systems.

The curriculum

The curriculum proposed in the guidelines follows the outline agreed at the 1984 harmonisation meeting (Cook, 1984). It is divided into three main areas: reprographics, computer applications, and telecommunications.

The guidelines give the framework for a central common course which includes elements from all these subjects. They assume that each profession will adapt the teaching of their own specific professional studies (cataloguing, information retrieval, archival management, etc) to allow for the influence of IT theory and practice.

The aim is to use a common knowledge of IT, and of its influence on professional practices, to reinforce a professional approach by all practitioners. The orientation of all courses will be towards the management of technical processes, not towards learning practical skills.

The introduction of IT does not change the balance between academic and practical elements in the teaching: both are necessary in information training; in fact, IT may cause a strengthening of theoretical aspects of training.

Local adaptation of the curriculum and local curriculum development, in the light of local resources and needs, is always desirable.

The curriculum is presented as a series of clusters of modules so as to assist such local planning.

The modules each represent a distinct aspect of IT, and have a certain independence. Courses based on the modules should be examined in various modes, according to what is most appropriate to each. It is a good practice if the professional associations can be associated with validating courses and awards.

Suggestions are given to allow adaptation of subjects for teaching at the different levels of admission: professional (graduate), senior management, paraprofessional.

The course components and modules are as follows:

FOUNDATION COURSE (IT)

This aims at providing education rather than training, and gives an overview of theory and practice to enable students to understand the subject in its general setting.

REPROGRAPHICS

Administrative reprographics: document production; xerography.

Microreprographics: planning, costing and managing microform systems; processing; information retrieval; maintenance and evaluation.

Publishing reprographics: book production; formats and processes; planning, costing, evaluating programmes.

COMPUTER APPLICATIONS

Word and text processing: in general administration, in the administration of information services.

Computing: general principles, and practical acquaintance with basic operating systems; terminology and concepts; basic knowledge of principal hardware varieties, and international applications. Teaching programming is not generally recommended for non-specialists.

Databases: knowledge of a command language, database management systems, and existing online databases. Practical contact should if possible use local databases.

Data storage technology: hardware and management.

TELECOMMUNICATIONS APPLICATIONS

A separate foundation course of limited weight may be required to put this group of subjects into technological and social context.

Telecommunications systems: digital and analog; hardware and transmission systems.

Telecommunications in information work: library applications, local and other networks.

Linkages with specialist information systems: audio, video, film.

A final section suggests ways of constructing courses from combinations of modules, taking account of the needs of the different information professions, differences in level of student intake, and differences in the type of training. Special consideration is given to courses for first entry at professional level, career development (senior management and specialists), first entry for paraprofessionals, continuing education, training for the establishment of a new service, and user education.

ABBREVIATIONS
used in the text.

CD	Compact Disk technology
COM	Computer Output to Microform
ECARBICA	East and Central African Regional Branch of ICA (qv)
FID	International Federation for Documentation & Information
ICA	International Council on Archives
IFLA	International Federation of Library Associations & Institutions
INSPEC	Information system managed by the Institute of Electrical Engineers, London
IT	Information Technology
NATIS	National Information Systems
OCLC	Online Computer Library Center
OCR	Optical Character Recognition
OECD	Organization for Economic Co-operation and Development
PGI	General Information Programme (of UNESCO)
RAMP	Records and Archives Management Programme (of UNESCO)
RLIN	Research Libraries Information Network
UJISLAA	UNESCO Journal of Information Science, Librarianship and Archives Administration
UNISIST	United Nations Information System for Science and Technology

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